



# DIRECTORY OF DISASTER-RELATED TECHNOLOGY



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
FEDERAL DISASTER ASSISTANCE ADMINISTRATION

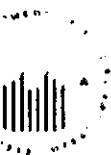
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1975





# DIRECTORY OF DISASTER-RELATED TECHNOLOGY



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
OFFICE OF ASSISTANT SECRETARY FOR TECHNOLOGY







# TABLE OF CONTENTS

	Page
<b>Preface</b>	iii
<b>User Guide</b>	iv
<b>Samples from Major Disaster Type Section</b>	v
<b>Geographic Areas Section</b>	vi
<b>Functional Categories Section</b>	vii
1. Functional Categories: Outline	viii
2. Functional Categories	ix
<b>Technological Categories Section</b>	x
1. Technological Categories: Outline	xi
2. Technological Categories	xii
<b>Major Disaster Types Section</b>	xiii
1. Aerial Incidents	xiv
2. Droughts	xv
3. Earthquakes	xvi
4. Explosive Incidents	xvii
5. Forest and Grass Fires	xviii
6. Flood	xix
7. Heat	xx
8. Hurricane	xxi
9. Land Slides	xxii
10. Land and Submarine	xxiii
11. Landslides	xxiv
12. Lowwater	xxv
13. Lowwater	xxvi
14. Lowwater	xxvii
15. Lowwater	xxviii
16. Lowwater	xxix
17. Lowwater	xxx
18. Lowwater	xxxi
19. Lowwater	xxxii
20. Lowwater	xxxiii
21. Lowwater	xxxiv
22. Lowwater	xxxv
23. Lowwater	xxxvi
24. Lowwater	xxxvii
25. Lowwater	xxxviii
26. Lowwater	xxxix
27. Lowwater	xl
28. Lowwater	xli
29. Lowwater	xlii
30. Lowwater	xliii
31. Lowwater	xliiii
32. Lowwater	xlv
33. Lowwater	xlvi
34. Lowwater	xlvii
35. Lowwater	xlviii
36. Lowwater	xlviii
37. Lowwater	l
38. Lowwater	li
39. Lowwater	lii
40. Lowwater	liii
41. Lowwater	liiii
42. Lowwater	lv
43. Lowwater	lvi
44. Lowwater	lvii
45. Lowwater	lviii
46. Lowwater	lviii
47. Lowwater	lvi
48. Lowwater	lvii
49. Lowwater	lviii
50. Lowwater	lviii
51. Lowwater	lvi
52. Lowwater	lvii
53. Lowwater	lviii
54. Lowwater	lviii
55. Lowwater	lvi
56. Lowwater	lvii
57. Lowwater	lviii
58. Lowwater	lviii
59. Lowwater	lvi
60. Lowwater	lvii
61. Lowwater	lviii
62. Lowwater	lviii
63. Lowwater	lvi
64. Lowwater	lvii
65. Lowwater	lviii
66. Lowwater	lviii
67. Lowwater	lvi
68. Lowwater	lvii
69. Lowwater	lviii
70. Lowwater	lviii
71. Lowwater	lvi
72. Lowwater	lvii
73. Lowwater	lviii
74. Lowwater	lviii
75. Lowwater	lvi
76. Lowwater	lvii
77. Lowwater	lviii
78. Lowwater	lviii
79. Lowwater	lvi
80. Lowwater	lvii
81. Lowwater	lviii
82. Lowwater	lviii
83. Lowwater	lvi
84. Lowwater	lvii
85. Lowwater	lviii
86. Lowwater	lviii
87. Lowwater	lvi
88. Lowwater	lvii
89. Lowwater	lviii
90. Lowwater	lviii
91. Lowwater	lvi
92. Lowwater	lvii
93. Lowwater	lviii
94. Lowwater	lviii
95. Lowwater	lvi
96. Lowwater	lvii
97. Lowwater	lviii
98. Lowwater	lviii
99. Lowwater	lvi
100. Lowwater	lvii
<b>Supporting Organization Section</b>	li
1. Alphabetical Listing of Supporting Organizations	lii
2. Addressed Listing of Supporting Organizations	liii
3. Supporting Organizations by Disaster Type	liiii
<b>Performing Organization Section</b>	lv
1. Alphabetical Listing of Performing Organizations	lv
2. Performing Organizations by Disaster Type	lv

1. Alphabetical Listing of Investigators .....	
2. Investigators by Disaster Type .....	
<b>Project Titles Section .....</b>	
<b>Selected Bibliography of Publications on Natural Hazards .....</b>	

# USER GUIDE

Information in the Directory is arranged in the following sections: Geographic Areas, Functional Categories, Technological Categories, Doer Types, Supporting Organizations, Performer Organizations, Investors, and Product Title.

Each project in the Directory is linked to a unique reference number to give it identity and status. In fact, it has ties to a section of the tree and means quick access to all the elements of information contained in the Directory. The first digit in the number indicates the character type to give it for Asyndetic - for Harmonic - *Hetero-Multiple*. Here *index* and the *nomenclature* digit are sequenced in the order in which the project appears in the Character Type Section.

Following is a brief description of each station in the order of appearance in the discussion:

THE GEOGRAPHIC AREAS SECTION refers to the locations in which the reported functions are applied, regardless of where the investigation was conducted. The project listed in this column is therefore defined in being specific as to the specific geographic area noted. Place names are state names, lake, mountain, etc. are arranged alphabetically. Cities or counties are listed in a subgroup within the state. The names are listed in the order in which they appear in the project, rather than alphabetically. For example, if there is a containing what information is available in the Directory on a specific geographic area, it is listed with this column.

The FUNCTIONAL CATEGORIES SECTION presents the information according to four broad headings: Individual Activities, Public Activities,

Director, Migration and Human Relations, with detailed information on number, sex, age, place of birth, citizenship, dates of arrival at Worcester, and other information in the Department of Immigration and Naturalization's files. The index is to be published in the form of a listing of alphabetical names, graded from "undetermined" to "undegraded" to "border" to "settled." A color reference map would identify the geographic location of each sample of persons, and the data would be useful for research on migration patterns and the impact of economic recession on the Polish American community. There would find the present to be a long project, but a number of individuals at the State and the National Archives would be interested in the project.

appears on a left-hand page is printed in the upper left-hand corner of that page; the last high level term on the right-hand page appears on the upper right-hand corner of the page.

THE TECHNOLOGY CATEGORIES SECTION is similar to the Functional Categories Section in structure, but the functional system used to arrange the information was developed by NCH and has been employed in other editions of this type. And, and the Abstracts have been also prepared. This section is divided into 14 sub-topics including brief abstracts, monographs, *functional categories*, *topical*, *periodicals*, *literature*, *technology*, *methods*, *transportation*, *function*, *functional systems*, *alphabetical*, *diffusion*, and *classification*, and *reference*, *monographs*, and *books*. A dictionary format is also used.

[illegible]

**THE SUPPORTING ORGANIZATION SECTION** consists of three parts: a simple alphabetical listing of all the supporting organizations appearing on the literature, with their address, number and address of support of the author organization for each reference; the price of the literature type; Section, a separate



**SECTION** consists of two parts: an alphabetical listing of performing organizations with reference numbers for the projects, and an alphabetical listing within each disaster type.

The **INVESTIGATOR/AUTHOR SECTION** also consists of two parts: the single alphabetical listing for the whole Directory and the alphabetical listing of investigators within each disaster type. Where the project was a group effort or no investigator was provided, the designation "Unknown" appears.

The **PROJECT TITLE LIST SECTION** is an alphabetical listing of all the projects in the Directory,

project or report summary. Each title is followed by a reference number referring to the full project or report summary in the Disaster Types Section.

All of the sections of the Directory were generated by computer, necessitating a limitation on the number of characters available for terms and captions; in some instances, therefore, abbreviations were used.

A bibliography, arranged by disaster types, is provided for those users who seek additional information on a number of topics related to natural disasters.

## SAMPLES FROM MAJOR DISASTER TYPES SECTION

### Subscription and Disaster type

### Functional Categories

Reference Number

Project title :

Investigator ..

### Performing Organization

### Project Summary (Ongoing)

Supporting Organization

Project Abstract (if completed) \_\_\_\_\_

### Availability

• 01100005

\* P. 101\110\11\112\113\114\115\116\117\118\119\120\121\122\123\124\125\126\127\128\129\130\131\132\133\134\135\136\137\138\139\140\141\142\143\144\145\146\147\148\149\150\151\152\153\154\155\156\157\158\159\160\161\162\163\164\165\166\167\168\169\170\171\172\173\174\175\176\177\178\179\180\181\182\183\184\185\186\187\188\189\190\191\192\193\194\195\196\197\198\199\200\201\202\203\204\205\206\207\208\209\210\211\212\213\214\215\216\217\218\219\220\221\222\223\224\225\226\227\228\229\230\231\232\233\234\235\236\237\238\239\240\241\242\243\244\245\246\247\248\249\250\251\252\253\254\255\256\257\258\259\260\261\262\263\264\265\266\267\268\269\270\271\272\273\274\275\276\277\278\279\280\281\282\283\284\285\286\287\288\289\290\291\292\293\294\295\296\297\298\299\300\301\302\303\304\305\306\307\308\309\310\311\312\313\314\315\316\317\318\319\320\321\322\323\324\325\326\327\328\329\330\331\332\333\334\335\336\337\338\339\340\341\342\343\344\345\346\347\348\349\350\351\352\353\354\355\356\357\358\359\360\361\362\363\364\365\366\367\368\369\370\371\372\373\374\375\376\377\378\379\380\381\382\383\384\385\386\387\388\389\390\391\392\393\394\395\396\397\398\399\400\401\402\403\404\405\406\407\408\409\410\411\412\413\414\415\416\417\418\419\420\421\422\423\424\425\426\427\428\429\430\431\432\433\434\435\436\437\438\439\440\441\442\443\444\445\446\447\448\449\450\451\452\453\454\455\456\457\458\459\460\461\462\463\464\465\466\467\468\469\470\471\472\473\474\475\476\477\478\479\480\481\482\483\484\485\486\487\488\489\490\491\492\493\494\495\496\497\498\499\500\501\502\503\504\505\506\507\508\509\510\511\512\513\514\515\516\517\518\519\520\521\522\523\524\525\526\527\528\529\530\531\532\533\534\535\536\537\538\539\540\541\542\543\544\545\546\547\548\549\550\551\552\553\554\555\556\557\558\559\560\561\562\563\564\565\566\567\568\569\570\571\572\573\574\575\576\577\578\579\580\581\582\583\584\585\586\587\588\589\590\591\592\593\594\595\596\597\598\599\600\601\602\603\604\605\606\607\608\609\610\611\612\613\614\615\616\617\618\619\620\621\622\623\624\625\626\627\628\629\630\631\632\633\634\635\636\637\638\639\640\641\642\643\644\645\646\647\648\649\650\651\652\653\654\655\656\657\658\659\660\661\662\663\664\665\666\667\668\669\670\671\672\673\674\675\676\677\678\679\680\681\682\683\684\685\686\687\688\689\690\691\692\693\694\695\696\697\698\699\700\701\702\703\704\705\706\707\708\709\710\711\712\713\714\715\716\717\718\719\720\721\722\723\724\725\726\727\728\729\730\731\732\733\734\735\736\737\738\739\740\741\742\743\744\745\746\747\748\749\750\751\752\753\754\755\756\757\758\759\760\761\762\763\764\765\766\767\768\769\770\771\772\773\774\775\776\777\778\779\780\781\782\783\784\785\786\787\788\789\790\791\792\793\794\795\796\797\798\799\800\801\802\803\804\805\806\807\808\809\810\811\812\813\814\815\816\817\818\819\820\821\822\823\824\825\826\827\828\829\830\831\832\833\834\835\836\837\838\839\840\841\842\843\844\845\846\847\848\849\850\851\852\853\854\855\856\857\858\859\860\861\862\863\864\865\866\867\868\869\870\871\872\873\874\875\876\877\878\879\880\881\882\883\884\885\886\887\888\889\890\891\892\893\894\895\896\897\898\899\900\901\902\903\904\905\906\907\908\909\910\911\912\913\914\915\916\917\918\919\920\921\922\923\924\925\926\927\928\929\930\931\932\933\934\935\936\937\938\939\940\941\942\943\944\945\946\947\948\949\950\951\952\953\954\955\956\957\958\959\960\961\962\963\964\965\966\967\968\969\970\971\972\973\974\975\976\977\978\979\980\981\982\983\984\985\986\987\988\989\990\991\992\993\994\995\996\997\998\999\1000\1001\1002\1003\1004\1005\1006\1007\1008\1009\1010\1011\1012\1013\1014\1015\1016\1017\1018\1019\1020\1021\1022\1023\1024\1025\1026\1027\1028\1029\1030\1031\1032\1033\1034\1035\1036\1037\1038\1039\1040\1041\1042\1043\1044\1045\1046\1047\1048\1049\1050\1051\1052\1053\1054\1055\1056\1057\1058\1059\1060\1061\1062\1063\1064\1065\1066\1067\1068\1069\1070\1071\1072\1073\1074\1075\1076\1077\1078\1079\1080\1081\1082\1083\1084\1085\1086\1087\1088\1089\1090\1091\1092\1093\1094\1095\1096\1097\1098\1099\1100\1101\1102\1103\1104\110

[illegible]

U.S. Dept. of Commerce, Technical Division  
Washington, D.C. 20540

For example, the Department of Health and Human Services, in its *Administrative Code of 48 CFR*, states:

[illegible]

**Proposition 4.6** Let  $\mathcal{H}$  be the set of all  $\mathcal{H}_1$  and  $\mathcal{H}_2$  such that  $\mathcal{H}_1 \cap \mathcal{H}_2 = \emptyset$ . Then  $\mathcal{H}$  is a  $\mathcal{H}_1$ - $\mathcal{H}_2$  partition of  $\mathcal{H}$  if and only if  $\mathcal{H}_1$  and  $\mathcal{H}_2$  are  $\mathcal{H}_1$ - $\mathcal{H}_2$  partitions of  $\mathcal{H}$ .

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

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101 211 11      35,517 1 35,517 1

2. 1942 年 10 月 25 日，在柏林，德意志广播电台广播了以下消息：

[illegible]

As a result of the above, the following conclusions can be drawn: (1) the use of the proposed method for the identification of the parameters of the model of the system of the object of control is possible; (2) the proposed method makes it possible to obtain the model of the system of the object of control with a high degree of accuracy; (3) the proposed method makes it possible to obtain the model of the system of the object of control with a high degree of accuracy; (4) the proposed method makes it possible to obtain the model of the system of the object of control with a high degree of accuracy.

1 2 3 4

1990

2000

[illegible][illegible]

7.  $2x^2 + 3x - 5$        $2x^2 + 3x - 5$        $2x^2 + 3x - 5$

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DATE 08-09-00 BY 60322 UCBAW

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

## Alabama

5 SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS

J. ROLLER, U.S. Dept. of the Interior, Geological Survey

1 PROFILING THE FOREST INCENDIARIST - AN ANALYSIS OF DOCUMENTED CASE HISTORIES

J. DUNKELBERGER, Auburn University, Agricultural Experiment Sta.

4 FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA

O. MING, U.S. Dept. of the Interior, Geological Survey

5 ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA

B. KNOWLES, State Geol. Survey

7 STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA

P. SNOW, Auburn University, Center For Urban & Reg. Plan.

8 A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION

UNKNOWN, South Alabama Reg. Plan. Comm.

9 FLOOD MANAGEMENT STUDY

UNKNOWN, Tuscaloosa Area Coun. of Gov.

10 FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971

UNKNOWN, Tuscaloosa Area Coun. of Gov.

11 FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA

A.L. KNIGHT, U.S. Dept. of the Interior, Geological Survey

12 LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW

J. COHEN, Univ. of Alabama, Natural Resources Center

13 FLOOD FREQUENCY OF ALABAMA STREAMS - ALABAMA

F. MCCAIN, U.S. Dept. of the Interior, Geological Survey

14 FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA

O. MING, U.S. Dept. of the Interior, Geological Survey

17 EARLY DETECTION AND CORRECTION OF SINKHOLE PROBLEMS - ALABAMA

G. NEWTON, U.S. Dept. of the Interior, Geological Survey

## Baldwin County

27 PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J.

E.T. KILLAM, Union County Planning Board

6.0158 A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION

UNKNOWN, South Alabama Reg. Plan. Comm.

## Escambia County

6.0127 PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J.

E.T. KILLAM, Union County Planning Board

6.0158 A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION

UNKNOWN, South Alabama Reg. Plan. Comm.

## Hale County

6.0160 FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971

UNKNOWN, Tuscaloosa Area Coun. of Gov.

## Jefferson County

6.0161 FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA

A.L. KNIGHT, U.S. Dept. of the Interior, Geological Survey

## Mobile County

6.0127 PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J.

E.T. KILLAM, Union County Planning Board

6.0158 A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION

UNKNOWN, South Alabama Reg. Plan. Comm.

## Moundsville

6.0160 FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971

UNKNOWN, Tuscaloosa Area Coun. of Gov.

## Pickens County

6.0160 FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971

UNKNOWN, Tuscaloosa Area Coun. of Gov.

## Alafia River

- 6.0234 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA  
J.F. TURNER, U.S. Dept. of the Interior, Geological Survey

## Alaska

- 1.0007 PUGET PEAK AVALANCHE, ALASKA  
M.C. HOYER, Arizona State University, School of Liberal Arts
- 1.0010 SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA  
R.D. MILLER, U.S. Dept. of the Interior, Geological Survey
- 3.0018 STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA EARTHQUAKE OF JUNE 21, 1967  
UNKNOWN, John A. Blume & Associates
- 3.0070 CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA  
E. BERG, Univ. of Alaska, Geophysical Institute
- 3.0071 EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA  
L. GEDNEY, Univ. of Alaska, Geophysical Institute
- 3.0072 INSTALLATION AND OPERATION OF A TELEMETERED SEISMIC NETWORK ON THE ALASKA PENINSULA  
UNKNOWN, Univ. of Alaska, Geophysical Institute
- 3.0094 EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA  
H.B. SEED, Univ. of California, Inst. of Trans. & Traf. Engin.
- 3.0131 TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA  
R. VONHUENE, U.S. Dept. of the Interior, Geological Survey
- 3.0172 GREATER ANCHORAGE AREA BOROUGH, ALASKA  
E. DOBROVOLNY, U.S. Dept. of the Interior, Geological Survey
- 3.0186 TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES  
UNKNOWN, Natl. Acad. of Sciences
- 3.0220 ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS  
E.R. ENGDAHL, U.S. Dept. of Commerce, Natl. Ocean Survey
- 3.0221 THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967  
J.N. JORDAN, U.S. Dept. of Commerce, Natl. Ocean Survey
- 3.0222 IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES  
3.0224 ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971  
UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories
- 3.0247 ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 3.0259 MEASUREMENTS FOR FAULT SLIP ON THE DENALI, FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS, ALASKA  
R. PAGE, Columbia University, Lamont Doherty Geol. Observ.
- 3.0262 A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA  
L.R. SYKES, Columbia University, Lamont Doherty Geol. Observ.
- 5.0013 STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING ERTS DATA - ALASKA  
W.A. DEUTSCHMAN, Smithsonian Institution
- 5.0019 METHODS FOR THE PREVENTION AND CONTROL OF LIGHTNING FIRES  
R.G. BAUGHMAN, U.S. Dept. of Agriculture, Intermt. For. & Rg. Exp. Sta.
- 6.0053 CHIENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION  
C.P. LINDNER, U.S. Army, Corps of Engineers
- 6.0163 DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL  
R.F. CARLSON, Univ. of Alaska, Inst. of Water Resources
- 6.0212 INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA  
L.S. LEVEEN, U.S. Dept. of the Interior, Geological Survey
- 9.0024 MECHANICS OF DEBRIS AVALANCHING IN SHALLOW TILL SOILS OF SOUTHEAST ALASKA  
D.N. SWANSTON, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta.
- 9.0060 ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO  
T.H. WU, Ohio State University, School of Engineering
- 10.0025 STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I  
R.J. LEWELLEN, Arctic Inst. of North America
- 13.0006 TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V  
UNKNOWN, U.S. Dept. of the Interior
- 13.0013 ALASKA GEOLOGIC EARTHQUAKE HAZARDS  
G. PLAFKER, U.S. Dept. of the Interior, Geological Survey
- 13.0017 ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA  
R.W. LEMKE, U.S. Dept. of the Interior, Geological Survey
- 13.0018 RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA  
J.T. MCGILL, U.S. Dept. of the Interior, Geological Survey

#### SUBARCTIC STUDY

*R. H. WHITT*, U.S. Army Waterway Experiment Station

14-0002. **NATURAL VOLCANIC SURVEILLANCE**  
ALASKA, HAWAII AND WASHINGTON

*F. L. RIGD*, U.S. Dept. of the Interior, Geological Survey

14-0008. **SEISMIC SURVEILLANCE OF ALASKA, HAWAII AND GUAM** VOLCANIC ZONE, COOK ISLAND, ALASKA

*J. K. HILL*, Univ. of Alaska, Geophysical Institute

14-0014. **GEOLOGICAL VOLCANOLOGY** WESTERN UNITED STATES, INCLUDING ALASKA AND HAWAII

*R. L. SMITH*, U.S. Dept. of the Interior, Geological Survey

15-0011. **SHORT TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA**

*D. D. HUMM*, Arctic Inst. of North America

15-0022. **OFFSET COASTAL PATTERNS FORMED BY SEDIMENT ACCUMULATION IN THE BEACH ZONE, ALASKA, NEW ZEALAND**

*M. C. HEDLEY*, Univ. of Melbourne, Dept. of Geology, Victoria, Australia

#### ANCHORAGE

AM001. **EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES** ALASKA AND CALIFORNIA

*H. D. MITCHELL*, Univ. of Oregon, Dept. of Civil Engineering, Eugene

AM012. **GRAVITY AND TIDAL GRAVITY RECORDING ALASKA**

*F. L. DORRINGTON*, U.S. Dept. of the Interior, Geological Survey

#### BARROW

15-0014. **SHORT TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA**

*D. D. HUMM*, Arctic Inst. of North America

#### CHENNAI

AM018. **SEDIMENTAL EFFECTS OF THE TAMPANKAL ALASKA EARTHQUAKE OF JUNE 12, 1964**

*J. S. SARGENT*, U.S. Army, Fort Belvoir, Illinois

AM221. **THE TAMPANKAL ALASKA EARTHQUAKE OF JUNE 12, 1964**

*J. S. SARGENT*, U.S. Dept. of the Interior, Geological Survey

6-0005. **CHENNAI RIVER FLOOD PROBLEMS** ALASKA. PROBLEMS RELATING TO CHANNEL DEVELOPMENT FROM A BANK EARTH PROTECTION. *C. F. FLETCHER*, U.S. Army, Corps of Engineers

#### CHENNAI

14-0018. **RECONSTRUCTION ENGINEERING GEOLOGY OF THE NIKKANA ALASKA**

*F. L. RIGD*, U.S. Dept. of the Interior, Geological Survey

#### CHENNAI

14-0006. **ALASKA ALASKA PIPELINE SUPPLEMENT, EXHIBITS AND TESTIMONY** VOLCANIC UNKNOWN, U.S. Dept. of the Interior

#### Alaska Range

AM001. **EVALUATION OF FEASIBILITY OF MINING SEISMICALLY ACTIVE FAULTS IN ALASKA**

*J. C. HILL*, Univ. of Alaska, Geophysical Institute

#### Alutian Islands

AM012. **INVESTIGATION AND CORRELATION OF TECTONICALLY SEISMIC NETWORK OF ALASKA, HAWAII**

*J. S. SARGENT*, Univ. of Alaska, Geophysical Institute

AM014. **THE TONGA HISTORY** NORTH PACIFIC TROPICAL MARINE ALASKA

*R. A. COHEN*, U.S. Dept. of the Interior, Geological Survey

AM220. **ALUTIAN SEISMICITY** SHALLOW SEISMICITY

*J. R. S. P. HILL*, U.S. Dept. of the Interior, Geological Survey

AM222. **IMPROVED BODY WAVE MAGNITUDE ALUTIAN EARTHQUAKES**

*C. F. HILL*, U.S. Dept. of the Interior, Geological Survey

AM223. **ALUTIAN SEISMIC PROGRAM** SEISMIC CALIBRATION, MARCH 1972

*J. S. SARGENT*, U.S. Dept. of the Interior, Geological Survey

AM224. **ALUTIAN SEISMIC PROGRAM** SEISMIC CALIBRATION, MARCH 1971

*J. S. SARGENT*, U.S. Dept. of the Interior, Geological Survey

AM243. **ALUTIAN SEISMIC PROGRAM** HYPOCENTER SEMINARY, OCTOBER 1972, APRIL 1973

*J. S. SARGENT*, U.S. Dept. of the Interior, Geological Survey

AM262. **A COMPREHENSIVE STUDY OF SEISMOTECTONICS OF THE ALUTIAN ALASKA**

*J. R. ALLEN*, Islands University, Portland, Oregon

14-0005. **TSUNAMI RESEARCH**

*C. R. MILLER*, U.S. Dept. of Commerce, Eastern B. I. Station

## **Anclote River**

- 6.0234** HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA

*J.F. TURNER*, U.S. Dept. of the Interior, Geological Survey

## **Appalachia**

- 3.0277** SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION

*G.A. BOLLINGER*, Virginia Polytechnic Institute, School of Arts

- 15.0039** SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA

*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

## **Appalachian System**

- 2.0024** METEOROLOGICAL DROUGHT IN TENNESSEE

*J.V. VAIKSNORAS*, U.S. Dept. of Commerce, Natl. Weather Service

- 3.0236** A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE

*O.W. NUTTLI*, St. Louis University, Graduate School

- 6.0400** URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY

*P.L. SOULE*, U.S. Dept. of the Interior, Geological Survey

## **Arctic**

- 10.0025** STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I

*R.I. LEWELLEN*, Arctic Inst. of North America

## **Arizona**

- 2.0008** PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV)

*T.J. HENDERSON*, Atmospherics Incorporated

- 3.0163** RISK MAPS AND FIELD INVESTIGATIONS

*S.T. ALGERMISSEN*, U.S. Dept. of the Interior, Geological Survey

- 3.0166** GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO

**10.0014** ARIZONA EARTH FISSURE INVESTIGATION  
*C. WINIKKA*, State Highway Department

- 12.0010** ARIZONA 'EDDY' TORNADOES

*R.S. INGRAM*, U.S. Dept. of Commerce, Natl. vice

## **TEMPE**

- 12.0010** ARIZONA 'EDDY' TORNADOES

*R.S. INGRAM*, U.S. Dept. of Commerce, Natl. vice

## **Arkansas**

- 3.0174** NEW MADRID EARTHQUAKE - ARKANSAS, KENTUCKY, MISSISSIPPI, MISSISSIPPI AND TENNESSEE

*M.F. KANE*, U.S. Dept. of the Interior, Geological Survey

- 3.0236** A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE

*O.W. NUTTLI*, St. Louis University, Graduate School

- 3.0269** EARTHQUAKE RISK EVALUATION OF DEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE

*F. KELLOGG*, Mississippi Ark. Tenn. Council

- 3.0270** REGIONAL EARTHQUAKE RISK STUDY OF SOUTHERN ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA

*UNKNOWN*, Mississippi Ark. Tenn. Council

- 6.0100** RED RIVER EMERGENCY BANK PROTECTION - LOUISIANA, ARKANSAS, AND TEXAS

*UNKNOWN*, U.S. Army, Engineer District

## **CRITTENDEN COUNTY**

- 3.0269** EARTHQUAKE RISK EVALUATION OF DEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE

*F. KELLOGG*, Mississippi Ark. Tenn. Council

## **Atlantic Coastal Plain**

- 3.0243** THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUNDWATER IN POST-OLIGOCENE DEPOSITS OF THE ATLANTIC COASTAL PLAIN

*P.H. JONES*, U.S. Dept. of the Interior, Geological Survey

## **Atlantic Ocean**

- 8.0005** ATLANTIC HURRICANE SEASON OF 1969  
*R.H. SIMPSON*, U.S. Dept. of Commerce, Service

- 8.0084** ATLANTIC TROPICAL SYSTEMS OF 1969

**8.0086 - COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CIRCUMSTANCES**

*FR. HOPE* U.S. Dept. of Commerce, Natl. Weather Service

**8.0091 - STATISTICAL DYNAMICAL PREDICTIONS OF HURRICANE TRACKS**

*C. J. NEUMANN* U.S. Dept. of Commerce, Natl. Hurricane Center

**8.0115 - MANUAL CONSIDERATIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 10-16, 1972**

*A. C. FORT* U.S. Dept. of Commerce, Techniques Development Lab

**8.0132 - ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE**

*R. H. SIMPSON* U.S. Dept. of Commerce, Natl. Weather Service

## Baker River

**11.0001 - PHYSICAL EVALUATION OF A CLOUD SEEDING TECHNIQUE FOR MODERNIZED CROCODAPHI MOUNTAIN - THE CANADIAN PROJECT**

*P. J. HOBBY* Univ. of Washington, School of Agr.

## Bay St. Louis

**8.0012 - GOALS TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI TO REDUCE THE DAMAGE OF HURRICANE CAMILLE NOVEMBER 6, 1969**

*UNKNOWN* S&W Assoc. & Eng'rs Inc.

**8.0078 - WIND AND SURGE DAMAGE DONE BY HURRICANE CAMILLE**

*H. C. THOM* U.S. Dept. of Commerce, Natl. Hurricane Center

## Bayou Lafourche

**8.0080 - GRANDISSE, LOUISIANA AND VICINITY HURRICANE PROTECTION AND WATER WATERSHED - BAYOU LAFOURCHE - LOUISIANA AND IRENA**

*UNKNOWN* U.S. Army Corps of Engineers

## Beech River

**8.0368 - BEECH RIVER WATERSHED PROJECT - TENNESSEE**

*C. H. SMITH* U.S. Geological Survey, WASH.

## Bering Sea

## Biscayne Bay

**6.0070 - STUDIES OF THE RED ALGAL IN BAY**

*C. L. HOFFMAN* Univ. of Miami, School of Mar.

## Blitterroot River

**6.0021 - HYDROGRAPHIC MAPPING AND PLANNING THE 50 AND 100 YEAR FLOOD ALONG THE BLITTERROOT VALLEY, MONTANA**

*K. M. SCHULTZ* Montana State University, Wyo. Rm. 104-106

## Black Hills

**6.0056 - BLACK HILLS FLOOD OF JUNE 2, 1936 - CANNONVILLE, U.S. Dept. of Commerce, Natl. Hurricane Center**

## Brazos River

**15.0006 - INVESTIGATION OF SHORELINE CHANGE - BRAZOS RIVER, TEXAS**

*R. N. MEYER* Texas A & M University, Syst. 513-501

## Buffalo Creek

**6.0018 - ANALYSIS OF COAL REFUSE DRAINAGE FROM BUFFALO CREEK, WEST VIRGINIA, NOVEMBER 1969**

*UNKNOWN* W. A. WATERS & Associates

**6.0040 - ANALYSIS OF COAL REFUSE DRAINAGE FROM BUFFALO CREEK, WEST VIRGINIA, NOVEMBER 1969**

*UNKNOWN* W. A. WATERS & Associates

**6.0045 - FLOOD HAZARD INFORMATION, CREEK, FORKAS COUNTY, WEST VIRGINIA, DISASTER CONDITIONS**

*UNKNOWN* U.S. Army Corps of Engineers

## Buzzards Bay

**8.0036 - OPERATIONS AND MAINTENANCE**

- 3.0005 BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971

P.J. HRADILEK, U.S. Army, Engineer District

- 3.0006 VAN NORMAN RESERVOIRS AREA, CALIFORNIA

R.F. YERKES, U.S. Dept. of the Interior, Geological Survey

- 3.0007 PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973

S.K. TAKAHASHI, U.S. Navy, Civil Engineering Lab.

- 3.0011 URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

UNKNOWN, State Div. of Mines & Geology

- 3.0012 THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE

R.H. PRYOCK, State Materials & Res. Dept.

- 3.0013 INVESTIGATION OF GROUND MOTION-DAMAGE RELATIONSHIPS FOR RESIDENTIAL BUILDINGS IN GLENDALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE, FEBRUARY 1

I. FARHOOMAND, John A. Blume & Associates

- 3.0014 RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

S.A. FREEMAN, John A. Blume & Associates

- 3.0015 OBSERVATIONS OF DAMAGE TO GLENDALE SWIMMING POOLS, MOBILE HOMES, AND COMMERCIAL BUILDINGS RESULTING FROM SAN FERNANDO EARTHQUAKE OF 1971

W.H. NELSON, John A. Blume & Associates

- 3.0017 DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

UNKNOWN, John A. Blume & Associates

- 3.0019 ENGINEERING SEISMOLOGY

L.R. ALLDREDGE, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0021 PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

F.E. MCCLURE, U.S. Dept. of Hou. & Urb. Dev., Off. of Policy Dev. & Res.

- 3.0022 REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV)

J.V. COYNE, Public Administration Service

- 3.0023 RESPONSE OF POWER SYSTEMS TO THE SAN FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971

A.J. SCHIFF, Purdue University, School of Aeronautics

- 3.0024 STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX B

Survey

- 3.0026 DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering

- 3.0028 STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES

B.A. BOLT, Univ. of California, School of Letters

- 3.0040 MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA

H.C. SHAI, Stanford University, School of Engineering

- 3.0042 NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING

D.E. HUDSON, Calif. Inst. of Technology, School of Engineering

- 3.0046 MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SWITCHYARD EQUIPMENT

A.E. ESKEL, State Dept. of Water Resources

- 3.0048 COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTICAL STRUCTURES BASED ON SEISMOGRAMS FROM THE SAN FERNANDO EARTHQUAKE (ABBREV)

S.A. FREEMAN, John A. Blume & Associates

- 3.0055 ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO EARTHQUAKE

H.S. LEW, U.S. Dept. of Commerce, Building Research Div.

- 3.0056 HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES

G. DEBUCHANANNE, U.S. Dept. of the Interior, Geological Survey

- 3.0074 THE UNPREDICTABLE DISASTER IN A METROPOLIS - PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971

L.B. BOURQUE, Univ. of California, Survey Research Center

- 3.0080 SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA

E.G. KEITH, Univ. of California, Seismographic Station

- 3.0094 EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA

H.B. SEED, Univ. of California, Inst. of Trans. & Traf. Engin.

- 3.0095 ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971

H.B. SEED, Univ. of California, Earthquake Engin. Res. Ctr.

- 3.0098 ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES

W. TSENG, Univ. of California, Earthquake Engin. Res. Ctr.

- 3.0100 RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER

L.C. DUTCHER, U.S. Dept. of the Interior, Geological Survey



THROUGH CASE STUDIES - SAN JERONIMO  
THROUGH CASE STUDIES.

COHEN, E. A. 1965. *Geology of Oregon*.

OPTIMIZATION OF WATER RESOURCE  
PLANNING OPPORTUNITIES THROUGH THE  
USE OF A SIMULATED SYSTEMS APPROACH.

MICROARTHOLOGY - MONITORING OF TON  
TECHNIQUE.

C. F. 1965. *Geology of Oregon*. 1965. 1965.

RELATIVE ACTIVITY OF MULTIPLE FAULT  
SYSTEMS - CALIFORNIA.

ROCKEY, E. A. 1965. *Geology of Oregon*.

STATION CHURCH OF THE COOP.

STATION CHURCH OF THE COOP.

REGIONAL GEOLOGY OF THE SAN JERONIMO  
THROUGH CASE STUDIES - SAN JERONIMO  
THROUGH CASE STUDIES.

STATION CHURCH OF THE COOP.

ENVIRONMENTAL GEOLOGY OF THE SAN  
JERONIMO REGION - CALIFORNIA.

STATION CHURCH OF THE COOP.

FAULT ZONE TECTONICS OF THE SAN JERONIMO  
THROUGH CASE STUDIES.

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- UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories
- 3.0162** A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA  
UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories
- 3.0166** GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO  
W.V. MICKY, U.S. Dept. of the Interior, Geological Survey
- 3.0173** EARTHQUAKES AND ACTIVE FAULTS  
J.S. DODD, U.S. Dept. of the Interior, Bureau of Reclamation
- 3.0180** TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
P.P. ORKILD, U.S. Dept. of the Interior, Geological Survey
- 3.0244** PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA - GLENDALE AREA  
J.R. MURPHY, Environmental Res. Corporation
- 3.0258** MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE  
F.J. GUMPER, Columbia University, Lamont Doherty Geol. Observ.
- 3.0261** SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES  
L.R. SYKES, Columbia University, Lamont Doherty Geol. Observ.
- 3.0264** AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA  
R.S. YEATS, Ohio University, School of Arts
- 5.0003** PHYSICAL CHARACTERISTICS OF CHAMISE AS A WILDLAND FUEL - CALIFORNIA  
C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0004** FIRE WEATHER AND FIRE BEHAVIOR AT THE 1968 CANYON FIRE - CALIFORNIA  
C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0005** GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA MIXED-CONIFER TYPE  
L.R. GREEN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0006** FOREST FIRE BEHAVIOR - CALIFORNIA  
C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Exp. Sta.
- 5.0009** EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV)  
G.C. BERNARDI, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0036** CHARACTERISTICS OF PEOPLE WHO START FIRES ...SOME PRELIMINARY FINDINGS  
J.R. CHRISTIANSEN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0039** PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL  
P.G. SCOWCROFT, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 6.0039** EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA  
M.W. BUSBY, U.S. Dept. of the Interior, Geological Survey
- 6.0042** SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT  
UNKNOWN, Council on Intergov. Relations
- 6.0043** FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA  
A.O. WAANANEN, State Dept. of Transportation
- 6.0044** SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPTH DURATION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA  
J.D. GOODRIDGE, State Dept. of Water Resources
- 6.0046** DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO  
G.S. NOLTE, San Diego Co. Comp. Plan. Org.
- 6.0166** THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA  
J.R. MCBRIDE, Univ. of California, School of Forestry
- 6.0168** PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA  
M.W. BUSBY, U.S. Dept. of the Interior, Geological Survey
- 6.0169** URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA  
J.A. SINGER, U.S. Dept. of the Interior, Geological Survey
- 6.0170** GLENDORA, CALIFORNIA, GENERAL PLAN 1990  
UNKNOWN, Glendora City Government
- 6.0172** SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT  
UNKNOWN, U.S. Army, Engineer District
- 6.0176** FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA  
A.O. WAANANEN, U.S. Dept. of the Interior, Geological Survey
- 6.0178** NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA

- 6.0181 DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SUMMARY REPORT  
*UNKNOWN*, San Diego Reg. Comp. Pl. Org.
- 6.0220 DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey
- 8.0041 WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION  
*C.E. CHATHAM*, U.S. Army, Waterways Experiment Station
- 8.0042 WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION  
*E.P. FORTSON*, U.S. Army, Waterways Experiment Station
- 9.0001 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA  
*T.W. DIBBLEE*, U.S. Dept. of the Interior, Geological Survey
- 9.0002 REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA  
*D.H. RADBRUCHHALL*, U.S. Dept. of the Interior, Geological Survey
- 9.0005 EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA  
*R.A. FORSYTH*, State Div. of Highways
- 9.0006 SUBAUDIBLE ROCK NOISE (SARN) AS A MEASURE OF SLOPE STABILITY, CALIFORNIA  
*R. MEARNS*, State Div. of Highways
- 9.0017 CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA  
*P.F. KERR*, Columbia University, School of Arts
- 9.0026 ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLEN DORA, CALIFORNIA  
*F.B. LEIGHTON*, Glendora City Government
- 9.0028 EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION  
*E.E. BRABB*, U.S. Dept. of the Interior, Geological Survey
- 9.0029 GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA  
*R.H. CAMPBELL*, U.S. Dept. of the Interior, Geological Survey
- 9.0030 MONTEREY BAY - CALIFORNIA  
*H.G. GREENE*, U.S. Dept. of the Interior, Geological Survey
- 9.0032 GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA  
*J. SCHLOCKER*, U.S. Dept. of the Interior, Geological Survey
- 9.0034 MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
*R.F. YERKES*, U.S. Dept. of the Interior, Geological Survey
- 9.0035 REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING  
*VIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA*  
*D.H. POOLE*, Univ. of California, School of Physical Sciences
- 9.0037 LIME SOIL STABILIZATION STUDY  
*R.A. FORSYTH*, State Div. of Highways
- 9.0038 EVALUATION OF 'ION EXCHANGE' LANDSLIDE CORRECTION TECHNIQUE - CALIFORNIA  
*T.W. SMITH*, State Div. of Highways
- 10.0015 MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
*L.A. BEYER*, U.S. Dept. of the Interior, Geological Survey
- 10.0018 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R  
*J.F. POLAND*, U.S. Dept. of the Interior, Geological Survey
- 10.0019 LAND SUBSIDENCE STUDIES IN THE SAN JOAQUIN VALLEY - CALIFORNIA  
*J.F. POLAND*, U.S. Dept. of the Interior, Geological Survey
- 11.0001 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)  
*J.T. ALFORE*, State Div. of Mines & Geology
- 13.0001 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA  
*C. PETRAUSKAS*, Univ. of California, School of Engineering
- 13.0002 GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS  
*J.B. SEED*, Calif. Inst. of Technology, Graduate School
- 13.0011 TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA  
*H.E. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 13.0014 ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA  
*H.C. WAGNER*, U.S. Dept. of the Interior, Geological Survey
- 13.0026 THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL  
*G.H. KEULEGAN*, U.S. Army, Waterways Experiment Station
- 13.0028 TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY  
*R.W. WHALIN*, U.S. Army, Waterways Experiment Station
- 14.0002 SATELLITE VOLCANO SURVEILLANCE - ALASKA, HAWAII AND WASHINGTON  
*P.L. WARD*, U.S. Dept. of the Interior, Geological Survey
- 14.0006 GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA  
*D.A. SWANSON*, U.S. Dept. of the Interior, Geological Survey
- 14.0007 VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON  
*D.R. CRANDELL*, U.S. Dept. of the Interior, Geological Survey

- 14.0008 THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey

- 15.0015 COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA

UNKNOWN, U.S. Army, Coastal Engin. Res. Center

- 16.0036 PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM SERVING THE EMERGENCY SERVICE DEPARTMENTS OF THE CITY OF LOS ANGELES (ABBREV)

UNKNOWN, Hughes Aircraft Company

- 16.0038 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

J.T. ALFORD, State Div. of Mines & Geology

- 16.0050 PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW

UNKNOWN, Unknown Inst. or Indiv. Grant

- 16.0051 PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION TASK COMPLETION REPORT

UNKNOWN, Unknown Inst. or Indiv. Grant

- 16.0052 THE DEVELOPMENT OF A MEANS FOR ASSESSING EMERGENCY MEDICAL RESOURCES

J.L. COSTANZA, Serendipity Incorporated

- 16.0054 ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT

D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey

- 16.0055 GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA

E.H. PAMPEYAN, U.S. Dept. of the Interior, Geological Survey

- 16.0056 SOIL ENGINEERING RESEARCH - CALIFORNIA

T.L. YUDD, U.S. Dept. of the Interior, Geological Survey

#### BERKELEY HILLS

- 6.0166 THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA

J.R. MCBRIDE, Univ. of California, School of Forestry

#### CRESCENT CITY

- 13.0001 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA

C. PETRAUSKAS, Univ. of California, School of Engineering

- 13.0026 THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL

#### DESERT HOT SPRINGS

- 9.0001 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA

T.W. DIBBLEE, U.S. Dept. of the Interior, Geological Survey

#### GLENDALE

- 3.0013 INVESTIGATION OF GROUND MOTION-DAMAGE RELATIONSHIPS FOR RESIDENTIAL BUILDINGS IN GLENDALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE, FEBRUARY 1

I. FARHOOMAND, John A. Blume & Associates

- 3.0244 PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA- GLENDALE AREA

J.R. MURPHY, Environmental Res. Corporation

#### GLENORA

- 6.0170 GLENORA, CALIFORNIA, GENERAL PLAN 1990

UNKNOWN, Glendora City Government

- 9.0026 ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLENORA, CALIFORNIA

F.B. LEIGHTON, Glendora City Government

#### GORMAN

- 9.0017 CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA

P.F. KERR, Columbia University, School of Arts

#### HOLLISTER

- 3.0156 ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLLISTER, CALIFORNIA

T.H. ROGERS, U.S. Dept. of Commerce, Earthquake Mechanism Lab.

- 9.0001 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA

T.W. DIBBLEE, U.S. Dept. of the Interior, Geological Survey

#### LONG BEACH

- 16.0050 PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW

UNKNOWN, Unknown Inst. or Indiv. Grant

- 16.0051 PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION TASK COMPLETION REPORT

UNKNOWN, Unknown Inst. or Indiv. Grant

#### LOS ANGELES

- 3.0040 MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA

H.C. SHAH, Stanford University, School of Engineering

**3.0162** A STUDY OF EARTHQUAKE LOSSES IN THE  
LOS ANGELES, CALIFORNIA AREA  
*UNKNOWN*, U.S. Dept. of Commerce, Environ. Research  
Laboratories

**9.0005** EARTHWORK REINFORCEMENT TECHNIQUES -  
LOS ANGELES AREA

*R.A. FORSYTH*, State Div. of Highways

**16.0036** PLAN FOR AN IMPROVED COMMUNICATIONS  
SYSTEM SERVING THE EMERGENCY SERVICE DE-  
PARTMENTS OF THE CITY OF LOS ANGELES (AB-  
BREV)

*UNKNOWN*, Hughes Aircraft Company

**16.0055** GEOLOGIC ENVIRONMENTAL MAPS FOR  
LAND-USE PLANNING, CALIFORNIA

*E.H. PAMPEYAN*, U.S. Dept. of the Interior, Geological Sur-  
vey

#### LOS ANGELES COUNTY

**3.0004** REPORTS OF THE EARTHQUAKE TASK  
FORCES - RECOMMENDATIONS OF THE LOS AN-  
GELES COUNTY EARTHQUAKE COMMISSION

*UNKNOWN*, Los Angeles Co. Bd. of Suprs.

**3.0101** RECOMMENDATIONS DEVELOPED FROM RE-  
PORTS OF THE EARTHQUAKE COMMISSION AND  
EARTHQUAKE TASK FORCES - SAN FERNANDO  
EARTHQUAKE (ABBREV)

*UNKNOWN*, Los Angeles Co. Bd. of Suprs.

**5.0009** EMPLOYMENT OF AIR OPERATIONS IN THE  
FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM,  
HELD AT ARGONNE NATIONAL LABORATORY  
(ABBREV)

*UNKNOWN*, Natl. Acad. of Sciences

**5.0012** THE GREAT OAKLAND, LOS ANGELES, AND  
SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970

*R.S. ALGER*, U.S. Navy, Ordnance Laboratory

**9.0029** GEOLOGY OF THE POINT DUME QUADRAN-  
GLE AND THE LOS ANGELES COUNTY PART OF  
THE TRIUNFO PASS QUADRANGLE, LOS ANGELES  
CO. COOPERATIVE, CALIFORNIA

*R.H. CAMPBELL*, U.S. Dept. of the Interior, Geological Sur-  
vey

**9.0034** MALIBU BEACH QUADRANGLE AND THE  
UNINCORPORATED PART OF THE TOPANGA  
QUADRANGLE, LOS ANGELES COUNTY COOPERA-  
TIVE, CALIFORNIA

*R.F. YERKES*, U.S. Dept. of the Interior, Geological Survey

**10.0018** LAND-SUBSIDENCE STUDIES IN CALIFORNIA -  
TO STUDY THE EXTENT, MAGNITUDE R

*J.F. POLAND*, U.S. Dept. of the Interior, Geological Survey

#### MONTEREY

**8.0041** WAVE AND SURGE CONDITIONS AFTER  
PROPOSED EXPANSION OF MONTEREY HARBOR,  
MONTEREY, CALIFORNIA - HYDRAULIC MODEL  
INVESTIGATION

*C.E. CHATHAM*, U.S. Army, Waterways Experiment Station

#### RIVERSIDE

**5.0033** FIRE ENVIRONMENTAL TEST CHAMBER - FI-  
RE DESIGN AND DEVELOPMENT

*C.J. AUVIL*, U.S. Dept. of Agriculture, Pac. Sw. For. & R.  
Expt. Sta.

#### RIVERSIDE COUNTY

**6.0168** PERRIS VALLEY URBAN HYDROLOGY STUDY  
CALIFORNIA

*M.B. BUSBY*, U.S. Dept. of the Interior, Geological Survey

#### SACRAMENTO

**3.0040** MEASUREMENTS OF DYNAMIC CHARAC-  
TERISTICS OF MULTISTORY BUILDINGS IN  
CALIFORNIA

*H.C. SHAH*, Stanford University, School of Engineering

#### SAN DIEGO

**6.0046** DRAINAGE AND FLOOD CONTROL  
BACKGROUND AND POLICY STUDY - SAN DIEGO  
*G.S. NOLTE*, San Diego Co. Comp. Plan. Org.

**6.0181** DRAINAGE AND FLOOD CONTROL  
BACKGROUND AND POLICY STUDY - SUMMAR  
REPORT

*UNKNOWN*, San Diego Reg. Comp. Pl. Org.

**13.0002** GENERAL REVIEW OF THE SEISMIC HAZAR  
TO SELECTED U.S. NAVY INSTALLATIONS

*J.B. SEED*, Calif. Inst. of Technology, Graduate School

#### SAN DIEGO COUNTY

**5.0012** THE GREAT OAKLAND, LOS ANGELES, AND  
SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970

*R.S. ALGER*, U.S. Navy, Ordnance Laboratory

**6.0169** URBAN HYDROLOGY OF POWAY VALLEY  
CALIFORNIA

*J.A. SINGER*, U.S. Dept. of the Interior, Geological Survey

#### SAN FRANCISCO

**6.0220** DEVELOPMENT OF HYDROLOGIC DATA NE-  
EDS IN URBAN AREAS

*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

**9.0032** GEOLOGY OF THE POINT BONITA QUADRA-  
GLE, CALIFORNIA

*J. SCHLOCKER*, U.S. Dept. of the Interior, Geological Sur-  
vey

**13.0002** GENERAL REVIEW OF THE SEISMIC HAZAR  
TO SELECTED U.S. NAVY INSTALLATIONS

*J.B. SEED*, Calif. Inst. of Technology, Graduate School

## SAN JOSE

- 16.0052 THE DEVELOPMENT OF A MEANS FOR ASSESSING EMERGENCY MEDICAL RESOURCES  
*J.I. COSTANZA*, Serendipity Incorporated

## SANTA BARBARA

- 3.0157 AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA  
*A. SYLVESTER*, Univ. of California, School of Letters

## SANTA BARBARA COUNTY

- 6.0182 SEA COAST PLANNING PROJECT - CALIFORNIA  
*C. HETRICK*, Univ. of California, School of Letters

## SANTA ROSA

- 3.0025 THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969  
*K.V. STEINBRUGGE*, U.S. Dept. of Commerce, Natl. Ocean Survey

## VENTURA COUNTY

- 9.0029 GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA  
*R.H. CAMPBELL*, U.S. Dept. of the Interior, Geological Survey

## Caribbean Sea

- 8.0066 INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES  
*W.M. GRAY*, Colorado State University, School of Engineering
- 8.0086 COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY  
*J.R. HOPE*, U.S. Dept. of Commerce, Natl. Weather Service
- 8.0107 HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY)  
*UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.
- 8.0122 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER)  
*H.L. CRUTCHER*, U.S. Dept. of Commerce, Natl. Climatic Center

- 1.0006 AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT  
*E.R. LACHAPPELLE*, State Dept. of Highways

- 1.0009 THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
*J.D. FRIEDMAN*, U.S. Dept. of the Interior, Geological Survey

- 1.0011 WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS  
*M. MARTINELLI*, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta.

- 1.0014 AVALANCHE CONTROL IMPLEMENTATION STUDY  
*E. LACHAPPELLE*, State Dept. of Highways

- 3.0080 SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA  
*E.G. KEITH*, Univ. of California, Seismographic Station

- 3.0266 SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970  
*H.R. BLANK*, Univ. of Oregon, School of Liberal Arts

- 3.0280 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK  
*R.S. CROSSON*, Univ. of Washington, School of Arts

- 9.0051 EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON  
*D.H. GRAY*, Univ. of Michigan, School of Engineering

- 11.0007 PHYSICAL EVALUATION OF CLOUD SEEDING TECHNIQUES FOR MODIFYING OROGRAPHIC SNOWFALL - THE CASCADE PROJECT  
*P.V. HOBBS*, Univ. of Washington, School of Arts

- 14.0006 GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA  
*D.A. SWANSON*, U.S. Dept. of the Interior, Geological Survey

- 14.0007 VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON  
*D.R. CRANDELL*, U.S. Dept. of the Interior, Geological Survey

- 14.0016 SEISMIC ACTIVITY OF THE CASCADE VOLCANOES  
*S.W. SMITH*, Univ. of Washington, School of Arts

## Central United States

- 3.0233 STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT I.  
*O.W. NUTTLI*, U.S. Army, Waterways Experiment Station
- 3.0235 SOME GROUND MOTION AND INTENSITY RELATIONS FOR THE CENTRAL UNITED STATES  
*A. NECIOGLU*, St. Louis University, Graduate School

C.E. ANDERSON, Univ. of Wisconsin, School of Natural Sciences

9.0042 DENVER METROPOLITAN AREA, COLORADO  
R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey

9.0044 DENVER-FRONT RANGE URBAN CORRIDOR  
T.W. OFFIELD, U.S. Dept. of the Interior, Geological Survey

10.0004 COAL MINE DEFORMATION STUDIES, SOMERSET, COLORADO  
C.R. DUNRUD, U.S. Dept. of the Interior, Geological Survey

#### ADAMS COUNTY

6.0187 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

#### ARAPAHOE COUNTY

6.0187 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

#### BOULDER COUNTY

6.0187 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

#### COLORADO SPRINGS

4.0005 DENVER URBAN CORRIDOR STUDIES - COLORADO  
W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey

#### DENVER

3.0217 DENVER EARTHQUAKES  
L.E. GARONO, U.S. Army

3.0272 EARTHQUAKES INDUCED BY UNDERGROUND FLUID INJECTION  
W.C. MCCLAIN, Oak Ridge National Laboratory

4.0005 DENVER URBAN CORRIDOR STUDIES - COLORADO  
W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey

6.0048 FLOOD FREQUENCY IN URBAN AREAS, COLORADO  
G.L. DUCRET, U.S. Dept. of the Interior, Geological Survey

9.0042 DENVER METROPOLITAN AREA, COLORADO  
R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey

9.0044 DENVER-FRONT RANGE URBAN CORRIDOR  
T.W. OFFIELD, U.S. Dept. of the Interior, Geological Survey

#### DENVER COUNTY

6.0187 FLOOD FREQUENCY IN URBAN AREAS - COLORADO

#### DOUGLAS COUNTY

6.0187 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

#### FT. COLLINS

4.0005 DENVER URBAN CORRIDOR STUDIES - COLORADO  
W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey

#### JEFFERSON COUNTY

6.0187 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

#### LOGAN COUNTY

7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING  
UNKNOWN, U.S. Natl. Science Foundation

#### MORGAN COUNTY

7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING  
UNKNOWN, U.S. Natl. Science Foundation

#### WELD COUNTY

7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING  
UNKNOWN, U.S. Natl. Science Foundation

#### Connecticut

6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS - CONNECTICUT - HYDRAULIC MODEL INVESTIGATION  
G.A. PICKERING, U.S. Army, Waterways Experiment Station

6.0192 RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORAGE - DRAINAGE - CONNECTICUT  
UNKNOWN, Valley Regional Planning Agency

6.0193 SMALL STREAM FLOOD CHARACTERISTICS  
M.D. THOMAS, U.S. Dept. of the Interior, Geological Survey

6.0210 PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT  
J. HORTON, U.S. Dept. of the Interior, Geological Survey

8.0034 HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT  
UNKNOWN, U.S. Army, New England Division

#### ANSONIA

SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT  
UNKNOWN, Valley Regional Planning Agency.

#### DERBY

- 6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION

G.A. PICKERING, U.S. Army, Waterways Experiment Station

- 6.0192 RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT

UNKNOWN, Valley Regional Planning Agency.

#### NEW LONDON

- 8.0037 NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT

UNKNOWN, U.S. Army, New England Division

#### SEYMOUR

- 6.0192 RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT

UNKNOWN, Valley Regional Planning Agency.

#### SHELTON

- 6.0192 RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT

UNKNOWN, Valley Regional Planning Agency.

#### STRATFORD

- 8.0034 HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT

UNKNOWN, U.S. Army, New England Division

### Connecticut River

- 6.0105 FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN

P. AKILU, Univ. of Massachusetts, Water Resources Research Ctr.

- 6.0173 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS

N.Y. ARVANITIDIS, IN T A S A Incorporated

- 6.0291 ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES

- 6.0293 LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE CONNECTICUT RIVER FLOOD PLAINS

D. WILKES, Univ. of Massachusetts, Man & His Environment Inst.

- 6.0294 LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN

D. WILKES, Univ. of Massachusetts, Water Resources Research Ctr.

### Death Valley

- 3.0180 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH

P.P. ORKILD, U.S. Dept. of the Interior, Geological Survey

### Delaware

- 6.0336 THE POLITICAL ECONOMY OF WATER RESOURCES

D.J. ALLEE, State University of New York, Agricultural Experiment Sta.

- 8.0002 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA

F.J. SWAYE, Univ. of Delaware, School of Arts

- 15.0010 BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE

UNKNOWN, U.S. Army, Engineer District

#### SUSSEX COUNTY

- 8.0002 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA

F.J. SWAYE, Univ. of Delaware, School of Arts

### Delaware Basin

- 6.0130 REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK

J.A. FINCK, State Dept. of Env. Conserv.

### Delaware Bay

- 8.0002 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA

F.J. SWAYE, Univ. of Delaware, School of Arts



### 3.0229 SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS

*R.V. WHITMAN*, Mass. Inst. of Technology, School of Engineering

### 3.0263 TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS

*M. WYSS*, Columbia University, Lamont Doherty Geol. Observ.

### 6.0144 OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS

*B.M. REICH*, Penn. State University, Inst. Res. Land & Wtr. Resour.

### 8.0123 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972

*R.M. DEANGELIS*, U.S. Dept. of Commerce, Natl. Climatic Center

### 10.0026 RETURNING UNDERGROUND COAL MINE WASTES TO MINED-OUT VOIDS

*R.A. CARPENTER*, Natl. Acad. of Sciences

### 11.0004 NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN

*UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

### 12.0013 NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN

*UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

## Edwards Plateau

### 6.0388 RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS

*W.G. KNISEL*, U.S. Dept. of Agriculture, Blackland Experiment Watershed

## Everglades National Park

### 10.0028 SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS

*B.G. VOLK*, Agric. Res. & Educ. Center

## Finger Lakes

### 6.0340 DRAINAGE STUDY - INVENTORY AND ANALYSIS

*UNKNOWN*, Genesee Finger Lake Reg. Board

## Flat River

### 3.0240 RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI

*W. STAUDER*, St. Louis University, School of Arts

## Florida

### 2.0003 CENTRAL FLORIDA SEEDING PROJECT

*J.D. MCFADDEN*, U.S. Dept. of Commerce, Research Flight Facility

### 2.0005 JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT

*J. SIMPSON*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

### 2.0010 FLORIDA CUMULUS SEEDING EXPERIMENT FOR DROUGHT MITIGATION, APRIL-MAY 1971

*W.L. WOODLEY*, U.S. Dept. of Commerce, Environ. Research Laboratories

### 2.0014 BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT

*R.J. RUSSELL*, Louisiana State Univ. Systems, Coastal Studies Institute

### 6.0005 FLOOD INSURANCE STUDY

*C. BARRIENTOS*, U.S. Dept. of Commerce, National Weather Service

### 6.0066 AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA

*J.E. REYNOLDS*, Univ. of Florida, School of Agriculture

### 6.0067 HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS)

*H. KLEIN*, U.S. Dept. of the Interior, Geological Survey

### 6.0068 RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA

*W.A. PIIT*, U.S. Dept. of the Interior, Geological Survey

### 6.0069 HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA

*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

### 6.0070 STUDIES OF THE RED ALGAE IN BISCAYNE BAY

*A. THORHAUG*, Univ. of Miami, School of Marine Science

### 6.0071 ESTUARINE HYDROLOGY OF TAMPA BAY

*C.R. GOODWIN*, U.S. Dept. of the Interior, Geological Survey

### 6.0072 ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT

*UNKNOWN*, East Cent. Florida Reg. Coun.

### 6.0230 GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTHWESTERN SEMINOLE COUNTY, FLORIDA

*W. ANDERSON*, U.S. Dept. of the Interior, Geological Survey

### 6.0231 SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS

*E.R. BARTLEY*, Tampa Bay Regional Plan. Coun.

### 6.0232 ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA

*UNKNOWN*, Tampa Bay Regional Plan. Coun.

ON SMALL DRAINAGE AREAS IN FLORIDA  
*W.C. BRIDGES*, U.S. Dept. of the Interior, Geological Survey

**6.0234** HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA  
*J.F. TURNER*, U.S. Dept. of the Interior, Geological Survey

**6.0235** FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE  
*UNKNOWN*, Palm Beach Co. Area Plan. Bd.

**6.0236** FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972  
*UNKNOWN*, Palm Beach Co. Area Plan. Bd.

**8.0005** ATLANTIC HURRICANE SEASON OF 1972  
*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service

**8.0026** EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA  
*UNKNOWN*, Miami Federal Executive Board

**8.0103** BEACH CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE  
*C.J. SONU*, Louisiana State Univ. Systems, Coastal Studies Institute

**8.0123** PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972  
*R.M. DEANGELIS*, U.S. Dept. of Commerce, Natl. Climatic Center

**10.0028** SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS  
*B.G. VOLK*, Agric. Res. & Educ. Center

**10.0029** REMOTE SENSING, ALAFIA AND PEACE RIVER BASINS, FLORIDA  
*A.E. COKER*, U.S. Dept. of the Interior, Geological Survey

**12.0025** LIFE CYCLE OF FLORIDA KEYS' WATER-SPOUTS  
*J.H. GOLDEN*, U.S. Dept. of Commerce, Environ. Research Laboratories

**12.0039** SOME STATISTICAL ASPECTS OF WATER-SPOUT FORMATION - FLORIDA  
*J.H. GOLDEN*, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

**15.0005** KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA  
*A.J. MEHTA*, Univ. of Florida, School of Engineering

**15.0006** BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA  
*UNKNOWN*, U.S. Army, Engineer District

**15.0015** COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA  
*UNKNOWN*, U.S. Army, Coastal Engin. Res. Center

**15.0016** COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS  
*J.A. PURPURA*, Univ. of Florida, School of Engineering

**15.0017** A STUDY OF NEARSHORE PROCESSES IN

**6.0068** RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA  
*W.A. PITT*, U.S. Dept. of the Interior, Geological Survey

#### DADE COUNTY

**6.0068** RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA  
*W.A. PITT*, U.S. Dept. of the Interior, Geological Survey

**6.0069** HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

**8.0026** EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA  
*UNKNOWN*, Miami Federal Executive Board

**15.0006** BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA  
*UNKNOWN*, U.S. Army, Engineer District

#### FT. WALTON

**8.0103** BEACH CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE  
*C.J. SONU*, Louisiana State Univ. Systems, Coastal Studies Institute

#### ORANGE COUNTY

**6.0072** ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT  
*UNKNOWN*, East Cent. Florida Reg. Coun.

#### OSCEOLA COUNTY

**6.0072** ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT  
*UNKNOWN*, East Cent. Florida Reg. Coun.

#### PALM BEACH COUNTY

**6.0235** FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE  
*UNKNOWN*, Palm Beach Co. Area Plan. Bd.

**6.0236** FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972  
*UNKNOWN*, Palm Beach Co. Area Plan. Bd.

#### SARASOTA

**6.0231** SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS

- 6.0072 ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT  
UNKNOWN, East Cent. Florida Reg. Coun.
- 6.0230 GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA  
W. ANDERSON, U.S. Dept. of the Interior, Geological Survey

### Front Range

- 1.0012 PHYSICAL PROPERTIES OF ALPINE SNOW AS RELATED TO WEATHER AND AVALANCHE CONDITIONS  
M. MARTINELLI, U.S. Dept. of Agriculture, Rocky Mtn. For. & Rg. Ex. Sta.
- 4.0005 DENVER URBAN CORRIDOR STUDIES - COLORADO  
W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey
- 6.0185 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
K.L. PIERCE, U.S. Dept. of the Interior, Geological Survey
- 9.0044 DENVER-FRONT RANGE URBAN CORRIDOR  
T.W. OFFIELD, U.S. Dept. of the Interior, Geological Survey

### Galveston Bay

- 8.0013 TEXAS COAST HURRICANE SURGE MODEL STUDIES  
N.J. BROGDON, U.S. Army, Estuaries Division
- 8.0039 GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
W.H. BOBB, U.S. Army, Waterways Experiment Station
- 8.0040 GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION  
N.J. BROGDON, U.S. Army, Waterways Experiment Station
- 8.0045 GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV)  
R.A. SAGER, U.S. Army, Waterways Experiment Station
- 8.0046 GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
R.A. SAGER, U.S. Army, Waterways Experiment Station

### Garlock Fault

- 3.0111 SAN ADREAS FAULT - CALIFORNIA COOP  
M.M. CLARK, U.S. Dept. of the Interior, Geological Survey

- 5.0043 THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH  
D.T. WILLIAMS, U.S. Dept. of Agriculture, S.E. Forest Experiment Station
- 6.0033 SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA  
UNKNOWN, U.S. Army, Engineer District
- 6.0073 CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III  
L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center
- 6.0074 CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
A.M. LUMB, Georgia Inst. of Technology, Environmental Resources Center
- 6.0075 FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA  
H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey
- 6.0237 IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA  
C.F. FLOYD, Univ. of Georgia, School of Business Admin.
- 6.0240 THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT  
L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center
- 6.0241 TRAVEL TIME OF GEORGIA STREAMS  
A.M. LUMB, Georgia Inst. of Technology, Environmental Resources Center
- 6.0242 THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED  
J.R. WALLACE, Georgia Inst. of Technology, Environmental Resources Center
- 6.0244 ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA  
H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey
- 6.0245 WATER RESOURCES OF MIDDLE GEORGIA  
UNKNOWN, Middle Georgia Area Plan. Com.
- 15.0007 JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION  
UNKNOWN, U.S. Army, Engineer District

### ATLANTA

- 6.0240 THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT  
L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center
- 6.0242 THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED  
J.R. WALLACE, Georgia Inst. of Technology, Environmental Resources Center
- 6.0244 ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA  
H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey

## Grand Isle

- 8.0030** GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (AB-BREV)

UNKNOWN, U.S. Army, Engineer District

## Grand Traverse Bay

- 15.0026** COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES

J.M. ARMSTRONG, Univ. of Michigan, School of Engineering

## Great Basin

- 3.0180** TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH

P.P. ORKILD, U.S. Dept. of the Interior, Geological Survey

- 3.0180** TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH

P.P. ORKILD, U.S. Dept. of the Interior, Geological Survey

- 3.0258** MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE

F.J. GUMPER, Columbia University, Lamont Doherty Geolog. Observ.

## Great Lakes

- 6.0052** REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD

UNKNOWN, Internat. Joint Commission

- 6.0207** LAKE HYDROLOGY

L. BAJORUNAS, U.S. Dept. of Commerce, Limnology Division

- 6.0267** HYDROLOGIC MODELS OF THE GREAT LAKES

D.D. MEREDITH, Univ. of Illinois, School of Engineering

- 11.0003** THE MODIFICATION OF GREAT LAKES WINTER STORMS

H.K. WEICKMANN, U.S. Dept. of Commerce, Atmospheric Phys. & Chem. Lab.

- 11.0005** SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN

R.W. HARMS, U.S. Dept. of Commerce, Natl. Weather Service

J.M. ARMSTRONG, Univ. of Michigan, School of Engineering

- 16.0040** REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974

UNKNOWN, Internat. Joint Commission

## Gulf of Alaska

- 3.0131** TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA

R. VONHUENE, U.S. Dept. of the Interior, Geological Survey

- 13.0012** EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA

T.C. ROYER, Univ. of Alaska, Inst. of Marine Sciences

## Gulf of Mexico

- 8.0006** APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION

L.G. ANDERSON, Univ. of Miami, School of Marine Science

- 8.0040** GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION

N.J. BROGDON, U.S. Army, Waterways Experiment Station

- 8.0048** EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL

I.C. TALLANT, U.S. Army, Waterways Experiment Station

- 8.0049** THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST

T.W. BILHORN, Gulf Univ. Res. Consortium

- 8.0051** PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO

F.M. ABDELAAL, Univ. of California, School of Engineering

- 8.0076** HURRICANE EFFECTS ON PORT FACILITIES

R.D. MARSHALL, U.S. Dept. of Commerce, Natl. Bureau of Standards

- 8.0086** COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY

J.R. HOPE, U.S. Dept. of Commerce, Natl. Weather Service

- 8.0106** BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO

M.G. JOHNSON, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0107** HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY)

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0109** TROPICAL STORM SURGE FORECASTING

- C.P. JELENIAWSKI*, U.S. Dept. of Commerce, Techniques Development Lab
- 8.0122 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER)**  
*H.L. CRUTCHER*, U.S. Dept. of Commerce, Natl. Climatic Center
- 8.0132 ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE**  
*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service
- 15.0035 PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET**  
*C. MASON*, Texas A & M University System, Graduate School
- 15.0036 INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS**  
*W.N. SEELIG*, Texas A & M University System, Graduate School
- 15.0037 TEXAS BARRIER ISLANDS**  
*R.E. HUNTER*, U.S. Dept. of the Interior, Geological Survey

### Gulf Coastal Plain

- 3.0243 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN**  
*P.H. JONES*, U.S. Dept. of the Interior, Geological Survey
- 6.0067 HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS)**  
*H. KLEIN*, U.S. Dept. of the Interior, Geological Survey
- 10.0008 STATUS OF LAND SUBSIDENCE DUE TO GROUND-WATER WITHDRAWAL IN MISSISSIPPI**  
*D.M. KEADY*, Mississippi St. University, School of Arts
- 10.0032 CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA**  
*A.P. DELFLACHE*, Lamar University, School of Engineering

### Hawaii

- 6.0076 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII**  
*Y. FOK*, Univ. of Hawaii, Water Resources Research Ctr.
- 6.0077 FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII**  
*Y.S. FOK*, Univ. of Hawaii, Water Resources Research Ctr.
- 6.0078 INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS**  
*R. WANG*, Univ. of Hawaii, Water Resources Research Ctr.
- 6.0246 SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III)**  
*C.M. FULLERTON*, Univ. of Hawaii, Cloud Physics Observatory
- 6.0247 HYDROLOGIC RELATIONS IN HAWAII**  
*D. JAY*, U.S. Army, Pacific Ocean Division
- 6.0249 SPECIAL FLOOD DATA COLLECTION, HAWAII**  
*R. LEE*, U.S. Dept. of the Interior, Geological Survey

- R.H. NAKAHARA*, U.S. Dept. of the Interior, Geological Survey
- 6.0251 SPECIAL FLOOD-DATA COLLECTION - HAWAII UNKNOWN**, U.S. Dept. of the Interior, Geological Survey
- 6.0252 HAWAII ENVIRONMENTAL SIMULATION MODEL**  
*D.C. COX*, Univ. of Hawaii, School of Arts
- 8.0097 GIANT WAVES HIT HAWAII**  
*J. BOTTOMS*, U.S. Dept. of Commerce, Natl. Weather Service
- 13.0009 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION**  
*A.M. KAMEL*, U.S. Army, Waterways Experiment Station
- 13.0010 STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION**  
*N.R. OSWALT*, U.S. Army, Waterways Experiment Station
- 13.0024 TSUNAMI SHORELINE TRACT**  
*G.P. WOOLLARD*, Univ. of Hawaii, Hawaii Inst. of Geophysics
- 13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS**  
*UNKNOWN*, U.S. Dept. of Commerce, Natl. Ocean Survey
- 13.0027 A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL**  
*G.H. KEULEGAN*, U.S. Army, Waterways Experiment Station
- 14.0001 VOLCANIC HAZARDS ON THE ISLANDS OF HAWAII**  
*D.R. MULLINEAUX*, U.S. Dept. of the Interior, Geological Survey
- 14.0004 HAWAIIAN VOLCANO OBSERVATORY**  
*D.W. PETERSON*, U.S. Dept. of the Interior, Geological Survey
- 14.0008 THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA**  
*J.D. FRIEDMAN*, U.S. Dept. of the Interior, Geological Survey
- 14.0010 VOLCANIC HAZARDS, ISLAND OF HAWAII**  
*D.R. MULLINEAUX*, U.S. Dept. of the Interior, Geological Survey
- 14.0014 REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII**  
*R.L. SMITH*, U.S. Dept. of the Interior, Geological Survey
- 14.0015 RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I)**  
*J.B. FINLAYSON*, Univ. of Hawaii, Water Resources Research Ctr.
- 15.0018 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS**  
*P. FAN*, Univ. of Hawaii, Water Resources Research Ctr.
- 15.0026 COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES**

WADSWORTH PUBLICATION  
N.R. OSWALT, U.S. Army, Waterways Experiment Station  
**13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS**  
*UNKNOWN*, U.S. Dept. of Commerce, Natl. Ocean Survey

#### HONOLULU

**13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS**  
*UNKNOWN*, U.S. Dept. of Commerce, Natl. Ocean Survey

**15.0018 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS**  
*P. FAN*, Univ. of Hawaii, Water Resources Research Ctr.

#### KAHULUI

**13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS**  
*UNKNOWN*, U.S. Dept. of Commerce, Natl. Ocean Survey

#### Hebgen Lake

**3.0275 SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION**  
*R.B. SMITH*, Univ. of Utah, School of Mines

#### Hillsborough River

**6.0234 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA**  
*J.F. TURNER*, U.S. Dept. of the Interior, Geological Survey

#### Hilo Bay

**13.0009 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION**  
*A.M. KAMEL*, U.S. Army, Waterways Experiment Station

**13.0010 STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION**  
*N.R. OSWALT*, U.S. Army, Waterways Experiment Station

**13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS**  
*UNKNOWN*, U.S. Dept. of Commerce, Natl. Ocean Survey

**13.0027 A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL**  
*G.H. KEULEGAN*, U.S. Army, Waterways Experiment Station

#### Housatonic River

**6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION**  
*G.A. PICKERING*, U.S. Army, Waterways Experiment Station

#### Hurricane Creek

**6.0055 HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE**  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

**6.0200 HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY**  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

#### Hurricane Fault

**3.0276 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH**  
*S.H. WARD*, Univ. of Utah, School of Mines

#### Idaho

**3.0050 TETON DAM SEISMICITY - IDAHO**  
*W.V. MICKEY*, U.S. Dept. of the Interior, Geological Survey  
**3.0178 SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO**  
*S.S. ORIEL*, U.S. Dept. of the Interior, Geological Survey

**3.0184 HAMILTON 2 DEGREE**  
*J.D. WELLS*, U.S. Dept. of the Interior, Geological Survey  
**6.0003 SILVER VALLEY FLOOD - SOCIAL, PSYCHOLOGICAL EFFECTS**  
*C.D. HARVEY*, Boise State College, School of Arts

**6.0063 FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO**  
*C.A. THOMAS*, U.S. Dept. of the Interior, Geological Survey

**6.0079 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO**  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

**6.0080 A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO**  
*J.J. PEEBLES*, Univ. of Idaho, Water Resources Research Inst.

- 6.0253 NATURAL DISASTER ANALYSIS FOR IDAHO COUNTY, IDAHO, JUNE 1973  
H.W. LEE, State Planning & Com. Aff. Agcy
- 6.0254 MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO  
C.A. THOMAS, U.S. Dept. of the Interior, Geological Survey
- 9.0046 SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO  
B. SKIPPI, U.S. Dept. of the Interior, Geological Survey
- 12.0030 ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON  
T.T. FUJITA, Univ. of Chicago, School of Physical Sciences
- 14.0011 EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO  
S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey
- 14.0012 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO  
D. SCHLEICHER, U.S. Dept. of the Interior, Geological Survey
- 14.0013 SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO  
P.L. WILLIAMS, U.S. Dept. of the Interior, Geological Survey

#### SHOSHONE COUNTY

- 6.0003 SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS  
C.D. HARVEY, Boise State College, School of Arts

### Illinois

- 2.0011 DROUGHT CLIMATOLOGY OF ILLINOIS  
F.A. HUFF, State Water Survey
- 2.0012 POTENTIAL OF PRECIPITATION MODIFICATION IN MODERATE TO SEVERE DROUGHTS  
F.A. HUFF, State Water Survey
- 3.0174 NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE  
M.F. KANE, U.S. Dept. of the Interior, Geological Survey
- 3.0241 SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968  
W. STAUDER, St. Louis University, School of Engineering
- 5.0009 EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV)  
UNKNOWN, Natl. Acad. of Sciences
- 6.0058 FLOOD FLOWS FROM SMALL DRAINAGE AREAS  
J.D. CAMP, U.S. Dept. of the Interior, Geological Survey
- 6.0082 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS  
G.W. CURTIS, U.S. Dept. of the Interior, Geological Survey
- 6.0083 DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA -

- PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS  
UNKNOWN, Southwestern Ill. Plan. Comm.
- 6.0086 OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS  
H.M. KARARA, Univ. of Illinois, School of Engineering
- 6.0199 NUTWOOD WATERSHED, ILLINOIS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0255 DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
J.D. CAMP, U.S. Dept. of the Interior, Geological Survey
- 6.0256 FLOOD FREQUENCY STUDY ILLINOIS  
J.M. CARNS, U.S. Dept. of the Interior, Geological Survey
- 6.0258 NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS  
UNKNOWN, Macon Co. Regional Plan Comm.
- 6.0260 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS  
UNKNOWN, Stephenson Co. Planning Comm.
- 6.0261 FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS  
A.B. NOEHRE, U.S. Dept. of the Interior, Geological Survey
- 6.0262 PRIORITY AND PLANNING ELEMENTS FOR DEVELOPING ILLINOIS WATER RESOURCES  
UNKNOWN, State Dept. of Bus. & Dev.
- 6.0263 STREAMFLOW VARIABILITY - ILLINOIS  
K.P. SINGH, State Water Survey
- 6.0264 EVALUATION OF FLOOD RISKS  
V.T. CHOW, Univ. of Illinois, School of Engineering
- 6.0265 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS  
B.A. JONES, Univ. of Illinois, Agricultural Experiment Sta.
- 6.0266 AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO  
W.M. KETH, Univ. of Illinois, Water Resources Center
- 7.0008 STUDIES OF HAIL DATA IN 1970-72 - ILLINOIS  
S.A. CHANGNON, State Water Survey
- 7.0015 DESIGN OF HAIL SUPPRESSION EXPERIMENT IN ILLINOIS  
G.M. MORGAN, Univ. of Illinois, School of Liberal Arts
- 9.0011 ENGINEERING GEOLOGY - ILLINOIS  
W.C. SMITH, State Geol. Survey
- 12.0017 DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS  
S.A. CHANGNON, State Water Survey
- 12.0032 STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS  
S.A. CHANGNON, State Water Survey
- 12.0033 HYDROMETEOROLOGICAL ANALYSIS OF SEVERE RAINSTORMS - ILLINOIS  
F.A. HUFF, State Water Survey
- 12.0034 STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA  
G. MORGAN, State Water Survey

- 5.0009** EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV)  
*UNKNOWN*, Natl. Acad. of Sciences

- 6.0083** DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGO LAND AREA - COMPUTER SIMULATION PROGRAMS  
*D.H. CHURCHILL*, Illinois Inst. For Envir. Qlty

## FREEPORT

- 6.0260** A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS  
*UNKNOWN*, Stephenson Co. Planning Comm.

## GREENE COUNTY

- 6.0199** NUTWOOD WATERSHED, ILLINOIS  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

## JERSEY COUNTY

- 6.0199** NUTWOOD WATERSHED, ILLINOIS  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

## MACON COUNTY

- 6.0258** NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS  
*UNKNOWN*, Macon Co. Regional Plan Comm.

## MADISON COUNTY

- 6.0084** BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS  
*UNKNOWN*, Southwestern Ill. Plan. Comm.

## MONROE COUNTY

- 6.0084** BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS  
*UNKNOWN*, Southwestern Ill. Plan. Comm.

## RANDOLPH COUNTY

- 6.0084** BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS  
*UNKNOWN*, Southwestern Ill. Plan. Comm.

## STEPHENSON COUNTY

- 6.0260** A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS  
*UNKNOWN*, Stephenson Co. Planning Comm.

## Imperial Valley

- 3.0100** RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER  
*L.C. DUTCHER*, U.S. Dept. of the Interior, Geological Survey

## Indiana

- 6.0087** DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970  
*UNKNOWN*, Marion Co. Metrop. Dev. Dept.

- 6.0088** INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL  
*T.P. CHANG*, Purdue University, Water Resources Research Ctr.

- 6.0208** HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA  
*COOK*, U.S. Dept. of the Interior, Geological Survey

- 6.0266** AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO  
*W.M. KEITH*, Univ. of Illinois, Water Resources Center

- 6.0268** ZONING ORDINANCE - KNOX COUNTY, INDIANA  
*UNKNOWN*, Clyde E. Williams & Assoc. Inc

- 6.0270** THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA  
*J.W. DELLEUR*, Purdue University, School of Engineering

- 6.0271** WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION  
*G.H. TOEBES*, Purdue University, School of Civil Engin.

- 6.0312** MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY  
*J.J. FRANCO*, U.S. Army, Waterways Experiment Station

- 10.0009** DETECTION OF SUBSURFACE OPENINGS - INDIANA, MISSOURI  
*E.R. BATES*, U.S. Army, Waterways Experiment Station

- 16.0082** CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I  
*F.A. HUFF*, State Water Survey

## KNOX COUNTY

- 6.0268** ZONING ORDINANCE - KNOX COUNTY, INDIANA  
*UNKNOWN*, Clyde E. Williams & Assoc. Inc



- 6.0270 THE EFFECT OF URBANIZATION ON  
HYDROLOGY OF WATERSHEDS - INDIANA  
J.W. DELLEUR, Purdue University, School of Engineering

## Iowa

- 6.0018 URBAN GROWTH, RUNOFF, EXTERNALITIES,  
AND INCOME DISTRIBUTION EFFECTS IN RAIL-  
STON CREEK WATERSHEDS  
J.R. BARNARD, Univ. of Iowa, School of Liberal Arts
- 6.0064 COLLECTION AND ANALYSIS OF STREAM  
FLOW AND RELATED HYDRAULIC DATA FOR  
DESIGN OF HIGHWAY BRIDGES AND CULVERTS -  
IOWA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0266 AN APPRAISAL OF FLOODPLAIN REGULA-  
TIONS IN THE STATES OF ILLINOIS, INDIANA,  
IOWA, MISSOURI AND OHIO  
W.M. KEITH, Univ. of Illinois, Water Resources Center
- 6.0274 FLOOD PROFILES OF IOWA STREAMS  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey
- 6.0275 FLOOD PROFILES & FLOOD-PLAIN INFOR-  
MATION, LINN COUNTY, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey
- 6.0276 FLOOD PROFILES & FLOOD-PLAIN INFOR-  
MATION, CEDAR RAPIDS, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey
- 6.0277 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION FOR UNIVERSITY BRANCH, DRY RUN  
CREEK, CEDAR FALLS, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey
- 6.0278 FLOOD FREQUENCY, LOG-PEARSON TYPE III  
ANALYSIS - IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey
- 6.0279 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION, CEDAR RAPIDS, IOWA  
H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey
- 6.0280 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION, LINN COUNTY, IOWA  
H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey
- 15.0008 PLANT SPECIES AS WILDLIFE COVER AND  
EROSION CONTROL ON 'MUDEFLATS' IN IOWA'S  
LARGE RESERVOIR SYSTEMS  
J.A. WILSON, Iowa State University, Water Resources  
Research Inst.

## Cedar Falls

- 6.0277 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION FOR UNIVERSITY BRANCH, DRY RUN  
CREEK, CEDAR FALLS, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey

H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey

## Linn County

- 6.0275 FLOOD PROFILES & FLOOD-PLAIN INFOR-  
MATION, LINN COUNTY, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey
- 6.0280 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION, LINN COUNTY, IOWA  
H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey

## Iowa River

- 6.0272 ECONOMIC FACTORS AFFECTING CROP  
THE INTENSITY OF FLOOD PLAIN USE  
J.R. BARNARD, Iowa State University, Water  
Research Inst.
- 6.0273 THE HUMAN ECOLOGICAL IMPACT OF  
STRUCTURAL FLOOD CONTROL ON THE  
RIVER, IOWA  
J.S. GARDNER, Iowa State University, Water  
Research Inst.

## James River

- 6.0396 NUMERICAL STUDIES OF UNSTEADY FLOW  
THE JAMES RIVER - VIRGINIA  
D.N. CONTRACTOR, Virginia Polytechnic Institute  
of Engineering
- 8.0135 OPERATION AGNES  
A. KUO, Virginia Inst. of Marine Sci.

## Jekyll Island

- 15.0007 JEKYLL ISLAND, GEORGIA, BEACH EROSION  
CONTROL AND HURRICANE PROTECTION  
UNKNOWN, U.S. Army, Engineer District

## Kaneohe Bay

- 6.0252 HAWAII ENVIRONMENTAL SIMULATION  
MODEL  
D.C. COX, Univ. of Hawaii, School of Arts

## Kansas

- 2.0013 DROUGHT IN KANSAS  
M.J. BROWN, Kansas State University, Agriculture  
ment Sta.

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES  
KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

BIG CREEK WATERSHED, KANSAS  
KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

MACADOO ROAD-FILL DAM, KANSAS  
KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

EFFECT OF URBANIZATION ON FLOOD RU-  
NOFF - WICHITA AREA, KANSAS

GEIGER, U.S. Dept. of the Interior, Geological Survey

EFFECT OF URBANIZATION ON FLOOD RU-  
NOFF - WICHITA AREA

RICHARDS, U.S. Dept. of the Interior, Geological Sur-  
vey

FORT SCOTT LAKE, MARMATON RIVER, KAN-  
SAS

KNOWN, U.S. Army, Engineer District

#### BARBER COUNTY

MACADOO ROAD-FILL DAM, KANSAS  
KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

#### BOURBON COUNTY

FORT SCOTT LAKE, MARMATON RIVER, KAN-  
SAS

KNOWN, U.S. Army, Engineer District

#### BUTLER COUNTY

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES

KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES

KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

#### CHASE COUNTY

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES

KNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES

6.0202 BIG CREEK WATERSHED, KANSAS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

#### LABETTE COUNTY

6.0141 BIG HILL LAKE, BIG HILL CREEK, KANSAS  
UNKNOWN, U.S. Army, Engineer District

#### LYON COUNTY

6.0202 BIG CREEK WATERSHED, KANSAS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

#### PRATI COUNTY

6.0203 MACADOO ROAD-FILL DAM, KANSAS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

#### WICHITA

6.0281 EFFECT OF URBANIZATION ON FLOOD RU-  
NOFF - WICHITA AREA, KANSAS

C.O. GEIGER, U.S. Dept. of the Interior, Geological Survey

6.0282 EFFECT OF URBANIZATION ON FLOOD RU-  
NOFF - WICHITA AREA

D.B. RICHARDS, U.S. Dept. of the Interior, Geological Sur-  
vey

#### WOODSON COUNTY

6.0202 BIG CREEK WATERSHED, KANSAS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

### Kansas River

6.0314 DEMONSTRATION OF THE ELECTRIC ANALOG  
MODEL OF THE KANSAS RIVER AT THE UNIVER-  
SITY OF CALIFORNIA IN BERKELEY  
UNKNOWN, U.S. Army, Waterways Experiment Station

### Kennebec River

6.0288 DATA AND MANAGEMENT NEEDS FOR  
WATER RELATED LAND AREAS - MAINE  
E. KEENE, North Kennebec Reg. Pln. Comm.

- 3.0174 NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE  
M.F. KANE, U.S. Dept. of the Interior, Geological Survey

- 3.0270 REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA  
UNKNOWN, Mississippi Ark. Tenn. Council

- 6.0093 FLOOD-FREQUENCY STUDY - KENTUCKY  
C.H. HANNUM, U.S. Dept. of the Interior, Geological Survey

- 6.0200 HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

- 6.0283 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY  
UNKNOWN, State Program Dev. Office

- 6.0284 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY  
UNKNOWN, State Program Dev. Office

- 6.0285 OPSET - PROGRAM FOR COMPUTERIZED SELECTION OF WATERSHED PARAMETER VALUES FOR THE STANFORD WATERSHED MODEL  
E.Y. LIU, Univ. of Kentucky, Water Resources Institute

- 6.0286 FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY  
A. WAHBY, Bullitt Co. Planning Comm.

- 6.0312 MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY  
J.J. FRANCO, U.S. Army, Waterways Experiment Station

- 9.0015 LANDSLIDES - KENTUCKY  
C.T. GORMAN, State Bur. of Highways

- 10.0007 ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY  
F.D. WRIGHT, Univ. of Kentucky, School of Engineering

## BULLITT COUNTY

- 6.0286 FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY  
A. WAHBY, Bullitt Co. Planning Comm.

## ELKHORN CITY

- 6.0283 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY  
UNKNOWN, State Program Dev. Office

## HOPKINS COUNTY

- 6.0200 HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

## PAINTSVILLE

## PIKE COUNTY

- 6.0283 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY  
UNKNOWN, State Program Dev. Office

## Key Biscayne

- 15.0015 COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA  
UNKNOWN, U.S. Army, Coastal Engin. Res. Center

- 15.0017 A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA  
C. EMILIANI, Univ. of Miami, School of Marine Science

## Kissimmee River

- 6.0066 AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA  
J.E. REYNOLDS, Univ. of Florida, School of Agriculture

## Klamath Mountains

- 3.0080 SEISMICITY OF MENDOCINO ESCARPMENT - GORDA RIDGE REGION - CALIFORNIA  
E.G. KETHI, Univ. of California, Seismographic Station

## Lake Champlain

- 6.0393 SURVEY OF LAKE FLOODING FROM ERTS-I - LAKE CHAMPLAIN  
A.O. LIND, Univ. of Vermont, School of Arts

## Lake Erie

- 6.0116 DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION  
C.E. CHATHAM, U.S. Army, Waterways Experiment Station
- 8.0113 MARINE ENVIRONMENTAL PREDICTION  
N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab.

- 15.0030 SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
L.L. BRAIDECH, State Div. of Geolog. Survey
- 15.0031 SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
L.L. BRAIDECH, State Div. of Geolog. Survey
- 15.0032 SHORE EROSION STUDIES ALONG THE OHIO

**Lake Michigan**  
DEVELOPMENT OF A FLOOD AND POLLUTION  
PLAN FOR THE CHICAGO AND AREA  
ER SIMULATION PROGRAMS  
CHILL, Illinois Inst. For Envir. Qbty  
OF ERIS-1 DATA - SUMMARY REPORT OF  
TEN TASKS  
ON, Environmental Res. Inst. Mich.  
INE ENVIRONMENTAL PREDICTION  
U.S. Dept. of Commerce, Techniques Develop.

ULATION MODEL FOR STORM CYCLES  
CH EROSION ON LAKE MICHIGAN  
Williams College, Graduate School  
FILE OF A STORM - WIND, WAVES AND  
ON THE SOUTHEASTERN SHORE OF  
CHIGAN  
Williams College, Graduate School

**Lake Okeechobee**  
RAL FLORIDA SEEDING PROJECT  
DEN, U.S. Dept. of Commerce, Research High  
IDA CONJUGAL SEEDING EXPERIMENT  
UGHT MITIGATION, APRIL-MAY 1971  
DLEY, U.S. Dept. of Commerce, Environ.  
Laboratories  
G-PERIOD WAVES AND SURGES  
T, U.S. Army, Coastal Engin. Res. Center

**Lake Ontario**  
NAGE STUDY - INVENTORY AND ANALY  
Genesee Finger Lake Reg. Board  
ERICAL STUDIES IN THE CIRCULATION  
RM SURGES IN LAKE ONTARIO  
niv. of Wisconsin, School of Letters

**Lake Pontchartrain**  
PONTCHARTRAIN, LOUISIANA - AND  
- HURRICANE PROTECTION PROJECT  
U.S. Army, Engineer District  
TS ON LAKE PONTCHARTRAIN - EA OF  
NE SURGE CONTROL STRUCTURES AND  
PI RIVER-GULF OUTLET CHANNEL  
T, U.S. Army, Waterways Experiment Station

**Lake Roosevelt**  
90017 EVALUATION OF CRITERIA FOR LANDSLIDE  
ANALYSIS AS PRESENTED BY THE U.S.G.S.  
TANSON, U.S. Dept. of the Interior, Bureau of Reclama-  
tion

**Lake Superior**  
80014 MARINE ENVIRONMENTAL PREDICTION  
A. E. TORP, U.S. Dept. of Commerce, Techniques Develop.  
ment Lab.

**Lewis Range**  
80021 A MODEL OF THE TOWNS OF GLACIER NA-  
TIONAL PARK, MONTANA  
R. H. WHITEHEAD, Cornell University, School of Biological  
Sciences

**Long Island Sound**  
150027 ENVIRONMENTAL GEOMORPHIC STUDY OF  
THE COASTAL RESOURCES ALONG THE SOUTH  
SHORE OF LONG ISLAND, NEW YORK  
DR. COLLEEN M. S. L., State Univ. of New York, School of Arts  
150028 GEOMORPHIC STUDY ON THE NORTH SHORE OF  
MIDDLE COUNTY, LONG ISLAND, NEW YORK,  
BETWEEN CORNY COVE AND PORT JEFFERSON  
HARBOR  
L. COLLIER, State Univ. of New York, School of Arts

**Los Angeles Basin**  
90029 GEOLOGY OF THE POINT DUME QUADRAN-  
GLE AND THE LOS ANGELES COUNTY PART OF  
THE TOPONGA QUADRANGLE, LOS ANGELES  
CO. COOPERATIVE CALIFORNIA  
R. H. ANDREWS, U.S. Dept. of the Interior, Geological Sur-  
vey  
90034 MALIBU BEACH QUADRANGLE AND THE  
UNINCORPORATED PART OF THE TOPONGA  
QUADRANGLE, LOS ANGELES COUNTY COOPERA-  
TIVE CALIFORNIA  
R. F. YERGEN, U.S. Dept. of the Interior, Geological Survey

**Louisiana**  
80094 TECHNOLOGY OF SMALL STREAMS IN  
LOUISIANA  
TANSON, U.S. Dept. of the Interior, Geological Survey

- 3.0 8.0014 SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969  
M.E. CRISWELL, U.S. Army, Waterways Experiment Station
- 6.0 8.0030 GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV)  
UNKNOWN, U.S. Army, Engineer District
- 6.0 8.0031 NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION  
UNKNOWN, U.S. Army, Engineer District
- 6.0 8.0032 LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT  
UNKNOWN, U.S. Army, Engineer District
- 6.0 8.0048 EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL  
I.C. TALLANT, U.S. Army, Waterways Experiment Station
- 6.0 8.0074 HURRICANE CAMILLE - AUGUST 1969  
R.D. DIKKERS, U.S. Dept. of Commerce, Building Research Div.
- 6.0 12.0015 MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971 - A REPORT TO THE ADMINISTRATOR  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin
9. 15.0021 NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION  
UNKNOWN, U.S. Army, Engineer District
- 10 16.0059 EMERGENCY OPERATIONS CONTINGENCY PLANNING - NEW ORLEANS, LOUISIANA  
A.I. ABERSMAN, System Development Corporation
6. 16.0082 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I  
F.A. HUFF, State Water Survey

#### FRANKLIN

- 6.0099 MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA)  
UNKNOWN, U.S. Army, Engineer District

#### LAFOURCHE PARISH

- 6 8.0030 GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV)  
UNKNOWN, U.S. Army, Engineer District

#### MORGAN CITY

- 6 6.0099 MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA)  
UNKNOWN, U.S. Army, Engineer District

- HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL  
I.C. TALLANT, U.S. Army, Waterways Experiment Station
- 16.0059 EMERGENCY OPERATIONS CONTINGENCY PLANNING - NEW ORLEANS, LOUISIANA  
A.I. ABERSMAN, System Development Corporation

### Maine

- 6.0287 SMALL STREAMS FLOOD FREQUENCY IN MAINE  
G.S. HAYES, State Highway Commission
- 6.0288 DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE  
E. KEENE, North Kennebec Reg. Pln. Comm.

### Manati River

- 6.0362 FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO  
UNKNOWN, State Planning Board

### Marmaton River

- 6.0315 FORT SCOTT LAKE, MARMATON RIVER, KANSAS  
UNKNOWN, U.S. Army, Engineer District

### Marthas Vineyard

- 15.0023 SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
C.A. KAYE, U.S. Dept. of the Interior, Geological Survey

### Maryland

- 6.0102 FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 8.0002 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA  
F.J. SWAYE, Univ. of Delaware, School of Arts
- 8.0005 ATLANTIC HURRICANE SEASON OF 1972  
R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service

6 0120 FLOOD CONTROL PROJECT HOONK RIVER  
NORTH ADAMS, MASSACHUSETTS  
UNKNOWN U.S. Army, Waterways Experiment Station

## BENEDICT

11 BLOCK REVENUEMENT NEAR  
MARYLAND  
Army, Coastal Engin. Res. Center

## SEEKONK

6 0295 DRAFT OF SEEKONK ZONING BY LAW 15  
NOVEMBER 1969  
J. H. K. W. L. L. State Dept. of Community Aff.

## Massachusetts

LOW CHARACTERISTICS OF SMALL  
MASSACHUSETTS

15 Dept. of the Interior, Geological Survey  
CONTROL PROJECT HOONK RIVER  
MASSACHUSETTS  
Army, Waterways Experiment Station

## WATERWAY

8 0044 DISCHARGE CHARACTERISTICS OF THE  
BURNING BARRIERS, WAREHAM MARION, MASS.  
MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION

U.S. ARMY, U.S. Army, Waterways Experiment Station

OF SEEKONK ZONING BY LAW 15  
1969

State Dept. of Community Aff.

N AND MAINTENANCE OF NEW  
BARRIERS, WAREHAM MARION, MASS.  
Army, New England Division

## Maumuh Bay

15 0018 DEPOSITION OF HAWAIIAN WATERSHED  
AND ESTUARINE SEDIMENT

U.S. ARMY, U.S. Army, Waterways Experiment Station

N AND MAINTENANCE OF NEW  
BARRIERS, WAREHAM MARION, MASS.  
Army, New England Division

## Meramec River

THE CHARACTERISTICS OF THE  
BARRIERS, WAREHAM MARION, MASS.  
- HYDRAULIC MODEL INVESTIGATION

6 0320 MERAMEC RIVER FLOOD CONTROL  
RIVER BASIN, MERAMEC RIVER, MISSOURI  
UNKNOWN U.S. Army, Waterways Experiment Station

U.S. Army, Waterways Experiment Station  
E EROSION STUDIES, MASS.

## Mexico

Dept. of the Interior, Geological Survey

## MARION

THE CHARACTERISTICS OF THE  
BARRIERS, WAREHAM MARION, MASS.  
- HYDRAULIC MODEL INVESTIGATION

6 0094 EFFECTS OF SOIL CONDITIONS ON GROUND  
MOVING TO BEING EXHIBITED IN ALABAMA AND  
CALIFORNIA

U.S. ARMY, U.S. Army, Waterways Experiment Station

U.S. Army, Waterways Experiment Station

6 0060 RECOGNIZING AND STUDY OF RECOVERABLE  
GROUNDWATER

U.S. ARMY, U.S. Army, Waterways Experiment Station

## NAHANT

E EROSION STUDIES, MASS.

## Michigan

Dept. of the Interior, Geological Survey

6 0298 USE OF TEST DATA - SUMMARY REPORT OF  
WORK ON THE FLOODS

U.S. ARMY, U.S. Army, Waterways Experiment Station

## New Bedford

N AND MAINTENANCE OF NEW  
BARRIERS, WAREHAM MARION, MASS.  
Army, New England Division

6 0292 PRELIMINARY OF THE MAINTENANCE AND  
PRELIMINARY OF FLOODS IN MICHIGAN

U.S. ARMY, U.S. Army, Waterways Experiment Station

15 0026 COASTAL ZONE AND SHORELINE  
MANAGEMENT - GREAT LAKES

## MONROE COUNTY

- 6.0298 USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS  
F.J. THOMSON, Environmental Res. Inst. Mich

## TRAVERSE CITY

- 15.0026 COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES  
J.M. ARMSTRONG, Univ. of Michigan, School of Engineering

## Midway Island

- 13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS  
UNKNOWN, U.S. Dept. of Commerce, Natl. Ocean Survey

## Minnesota

- 3.0115 EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA  
J.H. DIETERICH, U.S. Dept. of the Interior, Geological Survey
- 5.0016 FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA  
R.W. SANDO, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta.
- 6.0300 AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN  
A.R. HOPEMAN, Univ. of Minnesota, Water Resources Research Ctr.
- 6.0303 WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA  
R.W. MACLAY, U.S. Dept. of the Interior, Geological Survey
- 6.0304 FLOOD PLAIN STUDIES--MINNESOTA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0305 FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0306 SOCIO-ECONOMIC IMPLICATIONS OF ALTER-NATIVE WATER RESOURCES POLICIES IN MINNESOTA  
J.J. WAELTI, Univ. of Minnesota, School of Agriculture
- 16.0086 ROLE PERFORMANCE IN THE OPERATING SYSTEM - CIVIL DEFENSE OPERATIONS IN DIS-ASTER  
C.L. MULFORD, Iowa State University, School of Science

## Minnesota River

- 6.0300 AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA

- 6.0302 THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT  
UNKNOWN, Lower Minn. Riv. Wtrshed Dist
- 6.0305 FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

## Mississippi

- 2.0015 SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI  
J.C. MCWHORTER, Mississippi St. University, School of Agriculture
- 3.0174 NEW MADRID EARTHQUAKE - ARKANSAS, IL-INOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE  
M.F. KANE, U.S. Dept. of the Interior, Geological Survey
- 3.0236 A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSIS-SIPPI AND TENNESSEE  
O.W. NUTTLI, St. Louis University, Graduate School
- 3.0269 EARTHQUAKE RISK EVALUATION - CRITTEN-IDEN COUNTY, ARKANSAS, DESOTO COUNTY, MIS-SISSIPPI, AND SHELBY COUNTY, TENNESSEE  
F. KELLOGG, Mississippi Ark. Tenn. Council
- 3.0270 REGIONAL EARTHQUAKE RISK STUDY - MIS-SOURI, ARKANSAS, KENTUCKY, TENNESSEE, MIS-SISSIPPI AREA  
UNKNOWN, Mississippi Ark. Tenn. Council
- 4.0009 MAPPING OF SURFACE MATERIALS FOR PRE-DICTING FOUNDATION CHARACTERISTICS IN FU-TURE DEVELOPMENT OF HATTIESBURG  
B.W. BROWN, Univ. of Southern Mississippi, School of Science
- 5.0017 RESEARCH AND DEVELOPMENT OF FIRE PREVENTION TECHNOLOGY (FIRE PREVENTION)  
M.L. DOOLITTLE, Mississippi St. University, U.S.D.A. S. Forest Expt. Sta.
- 6.0065 FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI  
K.V. WILSON, U.S. Dept. of the Interior, Geological Survey
- 6.0114 BRIDGE SITE INVESTIGATIONS  
C.H. TATE, U.S. Dept. of the Interior, Geological Survey
- 6.0115 SPECIAL FLOOD REPORTS - MISSISSIPPI  
C.H. TATE, U.S. Dept. of the Interior, Geological Survey
- 6.0307 URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (AB-BREV)  
J.A. ELLIOTT, Diversified Consultants Inc.
- 6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-BREV)  
J.A. ELLIOTT, Diversified Consultants Inc.
- 6.0309 ZONING ORDINANCE AND SUBDIVISION REGULATIONS, ERIARD POINT, MISSISSIPPI

THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE  
*FFIR*, Unknown Inst. or Indiv. Grant

REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI  
*JOY*, Coast Code Administration

GRANT TO DESIGN A REBUILDING PLAN FOR PORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV)  
*OWN*, State Res. & Dev. Center

GRANT TO DESIGN A REBUILDING PLAN FOR PORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV (ABBREV)  
*OWN*, State Res. & Dev. Center

SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969  
*SWELL*, U.S. Army, Waterways Experiment Station

THE EFFECTS OF HURRICANE CAMILLE ON INDUSTRY, PUBLIC UTILITIES, AND PUBLIC WORKS OPERATIONS  
*ACK*, U R S Systems Corporation

HURRICANE CAMILLE - AUGUST 1969  
*KKERS*, U.S. Dept. of Commerce, Building Research

WIND AND SURGE DAMAGE DUE TO HURRICANE CAMILLE  
*OM*, U.S. Dept. of Commerce, Natl. Bureau of Standards

CKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI  
*EADY*, State Geol. Survey

STATUS OF LAND SUBSIDENCE DUE TO GROUND-WATER WITHDRAWAL IN MISSISSIPPI  
*EADY*, Mississippi St. University, School of Arts

MISSISSIPPI DELTA TORNADOES OF FEBRUARY, 1971 - A REPORT TO THE ADMINISTRATOR  
*OWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmospheric Admin.

COORDINATED ACCIDENT RESCUE ENFORCEMENT, STATE OF MISSISSIPPI (PROJECT CARE) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES  
*ARK*, Mississippi St. University, School of Engineering

## BILOXI

GRANT TO DESIGN A REBUILDING PLAN FOR PORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV (ABBREV)  
*OWN*, State Res. & Dev. Center

WIND AND SURGE DAMAGE DUE TO HURRICANE CAMILLE

3.0269 EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE  
*F. KELLOGG*, Mississippi Ark. Tenn. Council

## FRIARS POINT

6.0309 ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI  
*P. J. BARLOW*, State Comm. & Area Dev. Div.

## GULFPORT

8.0011 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV)  
*UNKNOWN*, State Res. & Dev. Center

8.0012 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV)  
*UNKNOWN*, State Res. & Dev. Center

## HANCOCK COUNTY

6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV)  
*J.A. ELLIOTT*, Diversified Consultants Inc.

8.0010 REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI  
*P. MONTJOY*, Coast Code Administration

## HARRISON COUNTY

6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV)  
*J.A. ELLIOTT*, Diversified Consultants Inc.

8.0010 REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI  
*P. MONTJOY*, Coast Code Administration

## HATTIESBURG

4.0009 MAPPING OF SURFACE MATERIALS FOR PREDICTING FOUNDATION CHARACTERISTICS IN FUTURE DEVELOPMENT OF HATTIESBURG  
*B.W. BROWN*, Univ. of Southern Mississippi, School of Science



- 6.0310 CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY  
B.E. WASSON, U.S. Dept. of the Interior, Geological Survey
- 6.0311 CITY OF JACKSON WATER RESOURCES STUDY  
K.V. WILSON, U.S. Dept. of the Interior, Geological Survey

#### JACKSON COUNTY

- 6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV)  
J.A. ELLIOTT, Diversified Consultants Inc.
- 8.0010 REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI  
P. MONTJOY, Coast Code Administration

#### MERIDIAN

- 6.0115 SPECIAL FLOOD REPORTS - MISSISSIPPI  
C.H. TATE, U.S. Dept. of the Interior, Geological Survey

#### MONROE COUNTY

- 9.0053 ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI  
D.M. KEADY, State Geol. Survey

#### PASCAGOULA

- 8.0012 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV)  
UNKNOWN, State Res. & Dev. Center

#### PEARL COUNTY

- 6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV)  
J.A. ELLIOTT, Diversified Consultants Inc.

#### SHELBY COUNTY

- 3.0269 EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE  
F. KELLOGG, Mississippi Ark. Tenn. Council

### Mississippi Embayment

- 6.0313 MISSISSIPPI BASIN MODEL  
UNKNOWN, U.S. Army, Waterways Experiment Station

- 6.0017 UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL  
UNKNOWN, Upper Miss. Riv. Comp. Comm.

- 6.0121 FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER VALLEY  
UNKNOWN, U.S. Army, Lower Miss. Valley Div.

- 6.0209 INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION TO THEMATIC MAPPING, MISSISSIPPI RIVER  
D.T. EDSON, U.S. Dept. of the Interior, Geological Survey

- 6.0320 MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI  
UNKNOWN, U.S. Army, Engineer District

- 8.0008 EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELEUR ISLAND CHAIN AND THE EASTERN PORTION OF THE LOWER MISSISSIPPI DELTA  
L.D. WRIGHT, Louisiana State Univ. Systems, Coastal Studies Institute

- 8.0031 NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION  
UNKNOWN, U.S. Army, Engineer District

- 8.0048 EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL  
I.C. TALLANT, U.S. Army, Waterways Experiment Station

- 10.0030 VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLGY INVESTIGATIONS - SOILS PHASE)  
C.C. CALHOUN, U.S. Army, Waterways Experiment Station

- 12.0015 MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971 - A REPORT TO THE ADMINISTRATOR  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 15.0021 NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION  
UNKNOWN, U.S. Army, Engineer District

### Mississippi Valley

- 3.0236 A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE  
O.W. NUTTLI, St. Louis University, Graduate School

- 3.0237 MAGNITUDE RECURRENCE RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES  
O.W. NUTTLI, St. Louis University, Graduate School

### Missouri

- 2.0004 STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER  
S.A. CHANGNON, Univ. of Illinois, State Water Survey Division

MISSOURI  
St. Louis University, School of Arts  
AL EARTHQUAKE RISK STUDY - MIS-  
KANSAS, KENTUCKY, TENNESSEE, MIS-  
EA  
Mississippi Ark. Tenn. Council  
FIRES IN MISSOURI  
U.S. Dept. of Agriculture, North Cen. Forest  
AY DESIGN FLOODS FOR SMALL DAMS  
MISSOURI  
GH, Univ. of Missouri, Water Resources  
PRAISAL OF FLOODPLAIN REGULA-  
THE STATES OF ILLINOIS, INDIANA,  
OURI AND OHIO  
Univ. of Illinois, Water Resources Center  
PMENT OF MAGNITUDE AND  
Y RELATIONSHIPS OF FLOODS ON  
EAMS OF MISSOURI  
U.S. Dept. of the Interior, Geological Survey  
LOGY OF STREAMS IN ST. LOUIS  
TAN AREA  
R, U.S. Dept. of the Interior, Geological Sur-  
GE REQUIREMENTS TO CONTROL  
WS OF MISSOURI STREAMS  
U.S. Dept. of the Interior, Geological Survey  
LOGY OF STREAMS IN ST. LOUIS  
MISSOURI  
U.S. Dept. of the Interior, Geological Survey  
EC PARK LAKE, UPPER MISSISSIPPI  
N, MERAMEC RIVER, MISSOURI  
U.S. Army, Engineer District  
TION OF SUBSURFACE OPENINGS - IN-  
SOURI  
U.S. Army, Waterways Experiment Station  
CHELTREE TORNADO - A CASE STUDY  
U.S. Air Force, Environ. Tech. Appl. Center  
TOLOGICAL ASSESSMENT OF URBAN  
N PRECIPITATION - PART I  
te Water Survey

## St. Louis

S OF URBAN EFFECTS ON RAINFALL  
E WEATHER  
ON, Univ. of Illinois, State Water Survey Divi-  
LOGY OF STREAMS IN ST. LOUIS  
TAN AREA  
R, U.S. Dept. of the Interior, Geological Sur-  
LOGY OF STREAMS IN ST. LOUIS  
MISSOURI  
U.S. Dept. of the Interior, Geological Survey

6.0319 HYDROLOGY OF STREAMS IN ST. LOUIS  
COUNTY - MISSOURI  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

## Missouri River

6.0313 MISSISSIPPI BASIN MODEL  
UNKNOWN, U.S. Army, Waterways Experiment Station

## Montana

3.0126 STRAIN STUDIES - CALIFORNIA, NEVADA,  
MONTANA  
J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey  
3.0127 CRUSTAL STRAIN - CALIFORNIA, NEVADA,  
MONTANA, UTAH AND NEW MEXICO  
J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey  
3.0184 HAMILTON 2 DEGREE  
J.D. WELLS, U.S. Dept. of the Interior, Geological Survey  
5.0021 A MODEL OF THE FORESTS OF GLACIER NA-  
TIONAL PARK, MONTANA  
R.H. WHITTAKER, Cornell University, School of Biological  
Sciences  
6.0125 APPLICATION OF HYDROLOGIC AND  
HYDRAULIC RESEARCH TO CULVERT SELECTION  
IN MONTANA - VOLUME I - REPORT  
E.R. DODGE, Montana State University, School of Engineer-  
ing  
6.0126 DEVELOPMENT OF AN OPERATIONS MODEL  
FOR MONTANA'S WATER RESOURCES, MIDDLE  
CREEK RESERVOIR OPERATION  
T.T. WILLIAMS, Montana State University, Water Resources  
Research Ctr.  
6.0321 FLOODPLAIN MAPPING AND PLANNING FOR  
THE 50 AND 100 YEAR INTERVAL FLOOD ZONES  
OF THE BUTTERROOT VALLEY, MONTANA  
K.M. NOLAN, Montana State University, Water Resources  
Research Ctr.  
9.0021 ROCK STRENGTH FROM FAILURE CASES -  
POWERHOUSE SLOPE STABILITY STUDY, FORT  
PECK DAM, MONTANA  
J.V. HAMEL, Hamel Geotechnical Consultants

## Monterey Bay

8.0041 WAVE AND SURGE CONDITIONS AFTER  
PROPOSED EXPANSION OF MONTEREY HARBOR,  
MONTEREY, CALIFORNIA - HYDRAULIC MODEL  
INVESTIGATION  
C.E. CHATHAM, U.S. Army, Waterways Experiment Station  
8.0042 WAVE AND SURGE ACTION, MONTEREY HAR-  
BOR, MONTEREY, CALIFORNIA - MODEL IN-  
VESTIGATION  
E.P. FORTSON, U.S. Army, Waterways Experiment Station

## Narragansett Bay

- 6.0117 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION

G.A. PICKERING, U.S. Army, Waterways Experiment Station

- 8.0047 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES

H.B. SIMMONS, U.S. Army, Waterways Experiment Station

- 8.0126 ANALYTICAL PHYSICAL MODEL

F.M. WHITE, Univ. of Rhode Island, School of Engineering

## Naugatuck River

- 6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION

G.A. PICKERING, U.S. Army, Waterways Experiment Station

## Navasota River

- 6.0151 ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS

D.R. BASCO, Texas A & M University System, School of Engineering

## Nebraska

- 2.0016 NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE

M.P. LAWSON, Univ. of Nebraska, School of Arts

- 6.0205 VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

- 7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING

UNKNOWN, U.S. Natl. Science Foundation

- 16.0014 CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20)

D.G. PENTERMAN, State Off. of the Adj. Gen.

## CHEYENNE COUNTY

- 6.0205 VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

- 7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING

UNKNOWN, U.S. Natl. Science Foundation

7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING  
UNKNOWN, U.S. Natl. Science Foundation

## Nevada

- 3.0117 INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA

M.J. JOHNSTON, U.S. Dept. of the Interior, Geological Survey

- 3.0126 STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA

J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey

- 3.0127 CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO

J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey

- 3.0133 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA

R.E. WALLACE, U.S. Dept. of the Interior, Geological Survey

- 3.0180 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH

P.P. ORKILD, U.S. Dept. of the Interior, Geological Survey

- 3.0245 SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972

K.C. BAYER, U.S. Dept. of Commerce, Earth Sciences Laboratory

- 3.0246 EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971

K.C. BAYER, U.S. Dept. of Commerce, Earth Sciences Laboratory

- 3.0249 SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA

A. RYALL, Univ. of Nevada, School of Mines

- 3.0250 EARTHQUAKE DISTRIBUTION AND MECHANISM OF FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VALLEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA

A. RYALL, Univ. of Nevada, School of Mines

- 3.0258 MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE

F.J. GUMPER, Columbia University, Lamont Doherty Geol. Observ.

- 6.0322 EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY

A.B. CUNNINGHAM, Univ. of Nevada, Desert Research Institute

- 7.0016 THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA

C.M. SAKAMOTO, U.S. Dept. of Commerce, Natl. Weather Service

- 9.0009 LOCATION OF SLOPE FAILURE PLANES

R.H. MERRILL, U.S. Dept. of the Interior, Bureau of Mines

- 11.0006 A SYNOPTIC CLIMATOLOGY FOR SNOWSTORMS IN NORTHWESTERN NEVADA

ANALYSIS OF SEISMICALLY AC-  
IN NEVADA, IN SUPPORT OF  
CONTROL EXPERIMENT - CALIFOR-  
UTAH  
Dept. of the Interior, Geological Survey

#### ELY

OF SLOPE FAILURE PLANES  
S. Dept. of the Interior, Bureau of Mines

#### LOVELOCK

NOPTIC CLIMATOLOGY FOR  
IN NORTHWESTERN NEVADA  
S. Dept. of Commerce, Natl. Weather Ser-

#### MINERAL COUNTY

ANALYSIS OF SEISMICALLY AC-  
IN NEVADA, IN SUPPORT OF  
CONTROL EXPERIMENT - CALIFOR-  
UTAH  
Dept. of the Interior, Geological Survey

#### RENO

NOPTIC CLIMATOLOGY FOR  
IN NORTHWESTERN NEVADA  
S. Dept. of Commerce, Natl. Weather Ser-

#### WINNEMUCCA

NOPTIC CLIMATOLOGY FOR  
IN NORTHWESTERN NEVADA  
S. Dept. of Commerce, Natl. Weather Ser-

## New Jersey

2.0018 THE DETERMINATION OF THE FREQUENCY  
OF DROUGHT FLOWS OF VARYING DEGREES OF  
SEVERITY AND DURATION - NEW JERSEY  
*E.G. MILLER*, U.S. Dept. of the Interior, Geological Survey

6.0022 THE METEOROLOGICAL AND HYDROLOGICAL  
ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS  
*A.S. KACHIC*, U.S. Dept. of Commerce, Weather Bureau

6.0127 PRELIMINARY STORM DRAINAGE AND FLOOD  
CONTROL PLAN - UNION COUNTY, N.J.  
*E.T. KILLAM*, Union County Planning Board

6.0323 HYDROLOGY OF SUBURBAN AREAS - NEW  
JERSEY  
*K. NATHAN*, Rutgers the State University, Agricultural Ex-  
periment Sta.

6.0325 FLOOD PLAIN AND PEAK FLOW STUDIES,  
NEW JERSEY  
*T.G. ROSS*, U.S. Dept. of the Interior, Geological Survey

6.0326 DETERMINATION OF FLOOD PEAKS, FLOOD  
PROFILES, & FLOOD INUNDATION - NEW JERSEY  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

8.0112 JOINT PROBABILITY METHOD OF TIDE  
FREQUENCY ANALYSIS APPLIED TO ATLANTIC  
CITY AND LONG BEACH ISLAND, NEW JERSEY  
*V.A. MYERS*, U.S. Dept. of Commerce, National Weather  
Service

#### BERGEN

6.0326 DETERMINATION OF FLOOD PEAKS, FLOOD  
PROFILES, & FLOOD INUNDATION - NEW JERSEY  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

#### BERGEN COUNTY

6.0326 DETERMINATION OF FLOOD PEAKS, FLOOD  
PROFILES, & FLOOD INUNDATION - NEW JERSEY  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

#### UNION COUNTY

6.0127 PRELIMINARY STORM DRAINAGE AND FLOOD  
CONTROL PLAN - UNION COUNTY, N.J.  
*E.T. KILLAM*, Union County Planning Board

## New Mexico

LAND RIVER BASINS COMMISSION,  
ORT, FISCAL YEAR 1971  
Water Resources Council  
LITICAL ECONOMY OF WATER

University of New York, Agricultural Ex-

CONDITIONS AND AUTOMATED  
OR THE ATLANTIC COASTAL STORM  
18-20, 1972  
Dept. of Commerce, Techniques Develop-

3.0127 CRUSTAL STRAIN - CALIFORNIA, NEVADA,  
MONTANA, UTAH AND NEW MEXICO  
*J.C. SAVAGE*, U.S. Dept. of the Interior, Geological Survey

6.0020 FLOOD OF JULY 17, 1972 IN GALLUP, NEW  
MEXICO  
*L.A. WAITE*, U.S. Dept. of the Interior, Geological Survey

- UNKNOWN, Albuquerque Urban Observatory
- 6.0129 INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO  
A.G. SCOTT, U.S. Dept. of the Interior, Geological Survey
- 6.0201 CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0327 FLOOD FREQUENCY STUDY IN NEW MEXICO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 9.0040 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO  
G.O. BACHMAN, U.S. Dept. of the Interior, Geological Survey
- 13.0011 TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA  
H.E. CLARK, U.S. Dept. of the Interior, Geological Survey

#### GALLUP

- 6.0020 FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO  
L.A. WAITE, U.S. Dept. of the Interior, Geological Survey

#### OTERO COUNTY

- 6.0201 CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

#### New York

- 3.0256 COMPILATION OF BRITTLE STRUCTURES WITHIN NEW YORK STATE  
Y.W. ISACHSEN, State Dept. of Education
- 6.0130 REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK  
J.A. FINCK, State Dept. of Env. Conserv.
- 6.0131 USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM  
C.S. LIU, State Dept. of Env. Conserv.
- 6.0133 WATER RELATED ENVIRONMENTAL SERVICES  
UNKNOWN, Central New York Reg. Pln. Bd.
- 6.0289 CLIMATES OF THE STATES - CLIMATE OF NEW YORK  
A.B. PACK, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.
- 6.0328 THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I  
A.C. TEDROW, State Div. of Water Resources
- 6.0329 STREAMS AND DRAINAGE BASINS - FULTON COUNTY, NEW YORK  
UNKNOWN, State Off. of Plan. Services

- UNKNOWN, State Off. of Plan. Services
- 6.0331 FLOOD INVESTIGATIONS - NEW YORK  
B. DUNN, U.S. Dept. of the Interior, Geological Survey
- 6.0332 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y.  
UNKNOWN, Aurora Planning Board
- 6.0333 NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE  
H.H. LADAGE, Columbia Co. Planning Dept.
- 6.0337 APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN  
J.W. KELLEY, State University of New York, Agricultural Experiment Sta.
- 6.0340 DRAINAGE STUDY - INVENTORY AND ANALYSIS  
UNKNOWN, Genesee Finger Lake Reg. Board
- 8.0115 MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972  
N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab.
- 8.0119 JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK  
T.C. HILL, U.S. Army, Waterways Experiment Station
- 8.0123 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972  
R.M. DEANGELIS, U.S. Dept. of Commerce, Natl. Climatic Center
- 9.0010 SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK  
UNKNOWN, Transportation Res. Board
- 15.0009 STATEN ISLAND BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, STATEN ISLAND, NEW YORK  
UNKNOWN, U.S. Army, Engineer District
- 15.0027 ENVIRONMENTAL GEOMORPHIC STUDY OF THE COASTAL REGIMES ALONG THE SOUTH SHORE OF LONG ISLAND - NEW YORK  
D.R. COATES, State University of New York, School of Arts
- 15.0028 GROIN STUDY ON THE NORTH SHORE OF SUFFOLK COUNTY, LONG ISLAND, NEW YORK, BETWEEN ORIENT POINT AND PORT JEFFERSON HARBOR  
T. OMHOLT, New York Ocean Science Lab.
- 16.0101 DISASTER RELIEF - DOMESTIC ACTION IN THE SPOTLIGHT  
E.J. RUSH, U.S. Army, War College

#### AURORA

- 6.0332 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y.  
UNKNOWN, Aurora Planning Board

#### COLUMBIA COUNTY

- 6.0333 NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE

ATION - VILLAGE OF EAST AURORA, N.Y.  
OF AURORA, N.Y.

WN, Aurora Planning Board

## FULTON COUNTY

REAMS AND DRAINAGE BASINS - FULTON  
TY, NEW YORK

WN, State Off. of Plan. Services

## NEW YORK CITY

UDY OF SEAWATER DESALTING AS EMER-  
Y WATER SUPPLY FOR NEW YORK CITY

EFFER, Parsons Jurden Corporation

## PUTNAM COUNTY

TNAM COUNTY OFFICIAL MAP  
ALS FOR REVISION AND EXPANSION

WN, State Off. of Plan. Services

## STATEN ISLAND

STATEN ISLAND BEACH EROSION CONTROL  
HURRICANE PROTECTION PROJECT, STATEN  
D, NEW YORK

WN, U.S. Army, Engineer District

## SUFFOLK COUNTY

ROIN STUDY ON THE NORTH SHORE OF  
LK COUNTY, LONG ISLAND, NEW YORK,  
EEN ORIENT POINT AND PORT JEFFERSON  
OR

OLT, New York Ocean Science Lab.

## WEST POINT

EAR STRENGTH OF FINE-GRAINED SOILS -  
POINT, NEW YORK

WN, Transportation Res. Board

## Nisqually River

OOD PROFILES AND INUNDATED AREAS  
G THE LOWER NISQUALLY RIVER,  
INGTON

IMANS, U.S. Dept. of the Interior, Geological Sur-

## North Carolina

EFFECTS OF URBANIZATION ON FLOODS AT  
ON-SALEM, NORTH CAROLINA

NAM, U.S. Dept. of the Interior, Geological Survey

6.0137 USE OF MULTISPECTRAL PHOTOGRAPHY IN  
WATER RESOURCE PLANNING AND MANAGE-  
MENT IN NORTH CAROLINA

C.W. WELBY, Univ. of North Carolina, School of Agriculture

6.0342 EFFECTS OF URBANIZATION ON FLOODS IN  
CHARLOTTE, NORTH CAROLINA

W.H. EDDINS, U.S. Dept. of the Interior, Geological Survey

6.0343 EFFECTS OF URBANIZATION ON FLOODS AT  
MORGANTON, NORTH CAROLINA

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey

9.0063 DEVELOPMENT OF CRITERIA FOR RECOGNIZ-  
ING & IDENTIFYING SLOPE FAILURE FORMS AS  
DEPICTED BY REMOTE SENSOR RETURNS -  
NORTH CAROLINA

D.H. POOLE, East Tenn. State University, Remote Sensing  
Institute

13.0019 LONG-PERIOD WAVES AND SURGES

UNKNOWN, U.S. Army, Coastal Engin. Res. Center

15.0029 EROSION AND DEPOSITION IN THE SOUNDS  
AND ESTUARIES OF THE NORTH CAROLINA  
COAST

R.L. INGRAM, Univ. of North Carolina, School of Arts

16.0096 THE CHARLOTTE CONSORTIUM TASK 1 RE-  
PORT - VOLUME IIA - ANALYSIS OF MUNICIPAL  
ACTIVITIES - PUBLIC SAFETY SUBSYSTEM

UNKNOWN, Unknown Inst. or Indiv. Grant

## CHARLOTTE

6.0342 EFFECTS OF URBANIZATION ON FLOODS IN  
CHARLOTTE, NORTH CAROLINA

W.H. EDDINS, U.S. Dept. of the Interior, Geological Survey

16.0096 THE CHARLOTTE CONSORTIUM TASK 1 RE-  
PORT - VOLUME IIA - ANALYSIS OF MUNICIPAL  
ACTIVITIES - PUBLIC SAFETY SUBSYSTEM

UNKNOWN, Unknown Inst. or Indiv. Grant

## DURHAM

6.0135 EFFECTS OF URBANIZATION ON FLOODS AT  
DURHAM, NORTH CAROLINA

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey

## LENOIR

6.0136 EFFECTS OF URBANIZATION ON FLOODS AT  
LENOIR, NORTH CAROLINA

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey

## MORGANTON

6.0343 EFFECTS OF URBANIZATION ON FLOODS AT  
MORGANTON, NORTH CAROLINA

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey

## North Central United States

### 5.0014 FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES

V.J. JOHNSON, Michigan State University, U.S.D.A. N. Cen. For. Ex. Sta.

### 6.0113 FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS

C.E. BOWERS, Univ. of Minnesota, St. Anthony Falls Hydr. Lab.

### 6.0301 FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS

A.F. PABST, Univ. of Minnesota, St. Anthony Falls Hydr. Lab.

## North Dakota

### 2.0020 DROUGHT AND WET SPELLS IN NORTH DAKOTA

J.M. RAMIREZ, North Dakota State University, Agricultural Experiment Sta.

### 6.0062 FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA

J.O. SHEARMAN, U.S. Dept. of the Interior, Geological Survey

### 6.0138 MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA

O.A. CROSBY, U.S. Dept. of the Interior, Geological Survey

### 6.0204 STARKWEATHER WATERSHED, NORTH DAKOTA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

### 6.0290 PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA

J.T. RIEDEL, U.S. Dept. of Commerce, National Weather Service

### 6.0344 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA

O.A. CROSBY, U.S. Dept. of the Interior, Geological Survey

### 7.0006 WEATHER MODIFICATION IN NORTH DAKOTA

W.J. PROMERSBERGER, North Dakota State University, Agricultural Experiment Sta.

## CAVALIER COUNTY

### 6.0204 STARKWEATHER WATERSHED, NORTH DAKOTA

DAKOTA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

## Northeast United States

### 5.0014 FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES

V.J. JOHNSON, Michigan State University, U.S.D.A. N. Cen. For. Ex. Sta.

## Northwest United States

### 3.0280 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK

R.S. CROSSON, Univ. of Washington, School of Arts

## Oahu

### 6.0076 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII

Y. FOK, Univ. of Hawaii, Water Resources Research Ctr.

### 6.0077 FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII

Y.S. FOK, Univ. of Hawaii, Water Resources Research Ctr.

### 6.0078 INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS

R. WANG, Univ. of Hawaii, Water Resources Research Ctr.

### 6.0252 HAWAII ENVIRONMENTAL SIMULATION MODEL

D.C. COX, Univ. of Hawaii, School of Arts

### 15.0018 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS

P. FAN, Univ. of Hawaii, Water Resources Research Ctr.

## Ohio

### 6.0059 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO

W.P. CROSS, U.S. Dept. of the Interior, Geological Survey

### 6.0116 DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION

C.E. CHATHAM, U.S. Army, Waterways Experiment Station

### 6.0266 AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO

W.M. KEITH, Univ. of Illinois, Water Resources Center

### 6.0345 COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES

G.M. CLARK, Ohio State University, School of Engineering

Ohio State University, School of Engineering  
 SLIPS IN SOUTHEASTERN OHIO  
 T.T. Ohio State University, School of Agriculture  
 ILIZATION OF STEEP LAND SLOPES -  
 AB, Ohio State University, School of Agriculture  
 IRONMENTAL INFLUENCES ON STABILITY  
 MASSES - ALASKA AND OHIO  
 Ohio State University, School of Engineering  
 ASURE AND DEPICT TROUBLE AREAS IN  
 MODELS - OHIO  
 L.L. State Dept. of Transportation  
 EQUENCY AND INTENSITY OF FREEZING  
 IZZLE IN OHIO  
 ER, U.S. Dept. of Commerce, Weather Bureau  
 NIA REBUILDS  
 V, Xenia Commission  
 ERE EROSION STUDY OF ERIE COUNTY,  
 DECH, State Div. of Geolog. Survey  
 ERE EROSION STUDY OF LAKE COUNTY,  
 DECH, State Div. of Geolog. Survey  
 ERE EROSION STUDIES ALONG THE OHIO  
 OF LAKE ERIE  
 ER, State Div. of Geolog. Survey  
 ALYSIS OF EMERGENCY MEDICAL SER-  
 COLUMBUS AND ALL FRANKLIN COUNTY  
 AL SUBDIVISIONS  
 E, Ohio State University, School of Medicine  
 MATOLOGICAL ASSESSMENT OF URBAN  
 S ON PRECIPITATION - PART I  
 , State Water Survey

#### EASTLAKE

IGN FOR FLOOD CONTROL AND WAVE  
 TION, CHAGRIN RIVER, EASTLAKE, OHIO -  
 ULIC MODEL INVESTIGATION  
 IAM, U.S. Army, Waterways Experiment Station

#### LAKE COUNTY

ERE EROSION STUDY OF LAKE COUNTY,  
 DECH, State Div. of Geolog. Survey

#### NOBLE COUNTY

SLIPS IN SOUTHEASTERN OHIO  
 T.T. Ohio State University, School of Agriculture

#### XENIA

NIA REBUILDS

DEVELOPMENT PROGRAM, COMMUNICATION  
 FROM CHAIRMAN, U. S. WATER RESOURCES  
 COUNCIL (ABBREV)

UNKNOWN, U.S. Water Resources Council

6.0312 MODEL STUDY OF CANNELTON LOCKS AND  
 DAM, OHIO RIVER, INDIANA AND KENTUCKY  
 J.J. FRANCO, U.S. Army, Waterways Experiment Station

### Oklahoma

2.0006 OKLAHOMA DROUGHT RELIEF OPERATIONAL  
 PROGRAM (ODROP)

J.L. SUTHERLAND, Weather Sciences Incorporated

2.0008 PROJECT ARID DROP, A SUMMARY REPORT  
 OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS  
 CONDUCTED BY ATMOSPHERICS INCORPORATED  
 (ABBREV)

T.J. HENDERSON, Atmospherics Incorporated

2.0009 HYGROSCOPIC SEEDING IN OKLAHOMA -  
 VOLUME I

P.B. MACCREADY, Flight Test Research Inc.

6.0139 STATEWIDE FLOOD-FREQUENCY REPORT -  
 OKLAHOMA

P.B. SAUER, U.S. Dept. of the Interior, Geological Survey

6.0140 INVESTIGATION AND ANALYSIS OF FLOODS  
 FROM SMALL WATERSHEDS IN OKLAHOMA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0142 BIRCH LAKE, BIRCH CREEK, OKLAHOMA

UNKNOWN, U.S. Army, Engineer District

6.0206 WHITEWATER CREEK HYDROLOGIC UNIT  
 PROJECT MEASURE, CHEROKEE HILLS RC AND D  
 PROJECT, OKLAHOMA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
 Service

6.0217 INVESTIGATION ON ANALYSIS OF FLOODS  
 FROM SMALL WATERSHEDS IN OKLAHOMA

W. THOMAS, U.S. Dept. of the Interior, Geological Survey

6.0350 APPRAISAL OF THE WATER AND RELATED  
 LAND RESOURCES OF OKLAHOMA - REGION  
 EIGHT - 1971

UNKNOWN, State Water Resour. Board

6.0351 APPRAISAL OF THE WATER AND RELATED  
 LAND RESOURCES OF OKLAHOMA

UNKNOWN, State Water Resour. Board

12.0007 MORPHOLOGY OF TWO TORNADIC STORMS -  
 AN ANALYSIS OF NSSL DATA ON APRIL 30, 1970 -  
 OKLAHOMA CITY, OKLAHOMA

S.L. BARNES, U.S. Dept. of Commerce, Natl. Severe Storms  
 Lab.

12.0022 OBSERVATIONS OF SEVERE STORMS ON 26  
 AND 28 APRIL 1971

C.L. VLCEK, U.S. Dept. of Commerce, Natl. Severe Storms  
 Lab.

12.0023 SEVERE STORM MORPHOLOGY - OKLAHOMA  
 S.L. BARNES, U.S. Dept. of Commerce, Environ. Research  
 Laboratories



K.C. CRAWFORD, U.S. Dept. of Commerce, Natl. Severe Storms Lab

16.0082 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I

F.A. HUFF, State Water Survey

DELAWARE COUNTY

6.0206 WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

OKLAHOMA CITY

12.0007 MORPHOLOGY OF TWO TORNADIC STORMS - AN ANALYSIS OF NSSI DATA ON APRIL 30, 1970 - OKLAHOMA CITY, OKLAHOMA

S.L. BARNES, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

OSAGE COUNTY

6.0142 BIRCH LAKE, BIRCH CREEK, OKLAHOMA

UNKNOWN, U.S. Army, Engineer District

Oregon

3.0266 SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970

H.R. BLANK, Univ. of Oregon, School of Liberal Arts

3.0267 LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON

UNKNOWN, U.S. Army, Engineer District

5.0037 REDUCING FIRE HAZARD IN PONDEROSA PINE THINNING SLASH BY MECHANICAL CRUSHING - OREGON

J.D. DELL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.

5.0040 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION

U.S. Dept. of Agriculture, Pac. S.W.

DISASTER STUDIES - COASTAL COUNTIES,

12.0030 ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON

T.T. FUJITA, Univ. of Chicago, School of Physical Sciences

14.0006 GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA

D.A. SWANSON, U.S. Dept. of the Interior, Geological Survey

14.0008 THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey

15.0033 EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC FACTORS INFLUENCING EROSION OF THE OREGON COAST

J.V. BYRNE, Oregon State University, School of Science

15.0034 EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS

R.L. FREDRIKSEN, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta.

CLATSOP COUNTY

8.0111 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS

C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques Development Lab.

LATAH COUNTY

6.0253 NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973

H.W. LEE, State Planning & Com. Aff. Agy

LINCOLN COUNTY

6.0354 DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973

UNKNOWN, Lincoln Co. Planning Dept.

TILLAMOOK COUNTY

8.0111 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS

C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques Development Lab.

TECHNICAL ASSISTANCE STUDY -  
STUDY ON THE PROBLEMS AND  
ES FOR DEVELOPMENT OF OSO  
OSO BAY

Coastal Bend Reg. Comm.

## Oso Creek

TECHNICAL ASSISTANCE STUDY -  
STUDY ON THE PROBLEMS AND  
ES FOR DEVELOPMENT OF OSO  
OSO BAY

Coastal Bend Reg. Comm.

## Oswego River

SYSTEMS ANALYSIS IN THE  
T OF WATER RESOURCES MANAGE-  
FOR NEW YORK STATE - AD-

pt. of Env. Conserv.

OF SYSTEMS ANALYSIS IN THE  
T OF WATER RESOURCES MANAGE-  
FOR NEW YORK STATE - VOLUME I  
ate Div. of Water Resources

## Pacific Ocean

HISTORY - NORTH PACIFIC CON-  
RGIN - ALASKA

U.S. Dept. of the Interior, Geological Sur-

TION OF SATELLITE OBSERVED  
RICANE CLOUD CLUSTERS AND  
ES

ado State University, School of Engineer-

## SUNAMI CATALOG

Hawaii, School of Arts

## Pamlico Sound

OD WAVES AND SURGES

Army, Coastal Engin. Res. Center

AND DEPOSITION IN THE SOUNDS  
ES OF THE NORTH CAROLINA

of North Carolina, School of Arts

## Pearl Harbor

N OF HAWAIIAN WATERSHED  
N SEDIMENTS

8.0012 GRANT TO DESIGN A REBUILDING PLAN FOR  
GULFPORT, MISSISSIPPI, TO RESTORE THE  
DAMAGE OF HURRICANE CAMILLE, VOLUMES IV  
& V (ABBREV)

UNKNOWN, State Res. & Dev. Center

## Pennsylvania

6.0008 MENTAL HEALTH SERVICES TO RESIDENTS  
OF FLOOD DISASTER AREAS IN CENTRAL RE-  
GION, COMMONWEALTH OF PENNSYLVANIA

UNKNOWN, State Dept. of Pub. Welfare

6.0009 MENTAL HEALTH SERVICES TO RESIDENTS  
OF FLOOD DISASTER AREAS IN LUZERNE-WYOM-  
ING COUNTIES OF THE COMMONWEALTH OF  
PENNSYLVANIA

UNKNOWN, Hazleton Nanticoke M.H. & M.R.

6.0010 TRAINING AND EVALUATION OF MENTAL  
HEALTH SERVICES TO RESIDENTS OF FLOOD DIS-  
ASTER AREAS IN COMMONWEALTH OF PENNSYL-  
VANIA

UNKNOWN, Eastern Penn. Psych. Institute

6.0011 MENTAL HEALTH SERVICES TO RESIDENTS  
OF FLOOD DISASTER AREAS IN LUZERNE-WYOM-  
ING COUNTIES, COMMONWEALTH OF PENNSYL-  
VANIA

UNKNOWN, Luzerne Wyoming Co. M.H. Prog.

6.0024 LOCK HAVEN URBAN RENEWAL PROJECT,  
LOCK HAVEN, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev.  
Disaster Rec. Off.

6.0025 MODEL CITIES ONE - URBAN RENEWAL PRO-  
JECT, READING, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev.  
Disaster Rec. Off.

6.0026 PENN-SUSQUEHANNA URBAN RENEWAL PRO-  
JECT, HARRISBURG, PENNSYLVANIA, HUD PRO-  
JECT NO. R-634C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev.  
Disaster Rec. Off.

6.0027 MILTON SOUTH, MILTON NORTH AND TUR-  
BOT TOWNSHIP DISASTER, URBAN RENEWAL  
PROJECTS, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Special  
Recovery Office

6.0028 DOWNTOWN URBAN RENEWAL PROJECT,  
WILKES-BARRE, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Special  
Recovery Office

6.0029 KINGSTON DISASTER URBAN RENEWAL PRO-  
JECT, BOROUGH OF KINGSTON, LUZERNE COUN-  
TY, PENNSYLVANIA, HUD PROJECT NO. R-615C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev.  
Disaster Rec. Off.

6.0144 OPTIMAL ANTECEDENT PRECIPITATION IN-  
DICES FOR SMALL EASTERN WATERSHEDS

B.M. REICH, Penn. State University, Inst. Res. Land & Wtr.  
Resour.

6.0145 FLOOD PREDICTION METHODS FOR PENNSYL-  
VANIA, URBAN RENEWAL PROJECT

6.0357 THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0361 EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA

B.M. REICH, Penn. State University, Inst. Res. Land & Wtr. Resour.

8.0005 ATLANTIC HURRICANE SEASON OF 1972

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service

8.0009 ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES

J.R. SCHUBEL, Johns Hopkins University, Graduate School

8.0123 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972

R.M. DEANGELIS, U.S. Dept. of Commerce, Natl. Climatic Center

9.0002 REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA

D.H. RADBRUCHHALL, U.S. Dept. of the Interior, Geological Survey

16.0079 THE INVESTIGATION OF SHELTER MANAGEMENT AND CONTROL IN NATURAL DISASTER

R.A. COLLINS, Amer. Inst. For Res.

16.0101 DISASTER RELIEF - DOMESTIC ACTION IN THE SPOTLIGHT

E.J. RUSH, U.S. Army, War College

#### HARRISBURG

6.0026 PENN-SUSQUEHANNA URBAN RENEWAL PROJECT, HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-634C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off.

16.0079 THE INVESTIGATION OF SHELTER MANAGEMENT AND CONTROL IN NATURAL DISASTER

R.A. COLLINS, Amer. Inst. For Res.

#### KINGSTON

6.0029 KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off.

#### LUZERNE COUNTY

6.0009 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA

UNKNOWN, Hazleton Nanticoke M.H. & M.R.

6.0011 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA

UNKNOWN, Luzerne Wyoming Co. M.H. Prog.

6.0029 KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off.

#### PITTSBURGH

9.0002 REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA

D.H. RADBRUCHHALL, U.S. Dept. of the Interior, Geological Survey

#### READING

6.0025 MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off.

#### WILKES-BARRE

6.0028 DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Special Recovery Office

#### WYOMING COUNTY

6.0009 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA

UNKNOWN, Hazleton Nanticoke M.H. & M.R.

6.0011 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA

UNKNOWN, Luzerne Wyoming Co. M.H. Prog.

## Perris Valley

PERRIS VALLEY URBAN HYDROLOGY STUDY,  
CALIFORNIA  
*BUSBY*, U.S. Dept. of the Interior, Geological Survey

## Point Mugu

PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973  
*AKAHASHI*, U.S. Navy, Civil Engineering Lab.

## Potomac River

ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORMS ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES  
*CHUBEL*, Johns Hopkins University, Graduate School

## Puerto Rico

DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO  
*APIEL*, Univ. of Puerto Rico, Agricultural Experiment

FLORIDA. SEISMICITY - 32 STATES AND PUERTO RICO  
*MICKEY*, U.S. Dept. of the Interior, Geological Survey  
FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS  
*RIGGS*, U.S. Dept. of the Interior, Geological Survey  
FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO  
*UNKNOWN*, State Planning Board

SEA-AIR INTERACTION LABORATORY OPERATIONS  
*STEWART*, U.S. Dept. of Commerce, Environ. Research Laboratories

## BARCELONETA

FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO  
*UNKNOWN*, State Planning Board

## MANATI

FLOOD CONTROL STUDY OF RIO GRANDE DE

## Puget Sound

3.0020 SEISMIC RISK - FDAA - WASHINGTON AND UTAH  
*S.T. ALGERMISSEN*, U.S. Dept. of the Interior, Geological Survey

3.0146 PUGET SOUND, WASHINGTON, EARTHQUAKE AND THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES  
*D. MCKENZIE*, Calif. Inst. of Technology, Seismological Laboratory

3.0280 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK  
*R.S. CROSSON*, Univ. of Washington, School of Arts

3.0281 BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN  
*B. GONEN*, Univ. of Washington, School of Engineering

## Ralston Creek

6.0018 URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS  
*J.R. BARNARD*, Univ. of Iowa, School of Liberal Arts

## Rappahannock River

8.0135 OPERATION AGNES  
*A. KUO*, Virginia Inst. of Marine Sci.

## Raymond Basin

10.0018 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE  
*J.F. POLAND*, U.S. Dept. of the Interior, Geological Survey

## Red River

6.0062 FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA  
*J.O. SHEARMAN*, U.S. Dept. of the Interior, Geological Survey

6.0100 RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS  
*UNKNOWN*, U.S. Army, Engineer District

6.0290 PROBABLE MAXIMUM ANNUAL AVERAGE SNOWMELT CRITERIA FOR NORTH ABOVE PEMBIN ABOVE MINOT NORTH D

## Rhode Island

- 6.0117 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION  
*G.A. PICKERING*, U.S. Army, Waterways Experiment Station
- 6.0297 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND  
*C.G. JOHNSON*, U.S. Dept. of the Interior, Geological Survey
- 8.0047 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES  
*H.B. SIMMONS*, U.S. Army, Waterways Experiment Station
- 8.0126 ANALYTICAL PHYSICAL MODEL  
*F.M. WHITE*, Univ. of Rhode Island, School of Engineering

## Rio Grande Depression

- 9.0040 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO  
*G.O. BACHMAN*, U.S. Dept. of the Interior, Geological Survey

## Rocky Mountains

- 1.0011 WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS  
*M. MARTINELLI*, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta.

## Rogue River

- 3.0267 LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON  
*UNKNOWN*, U.S. Army, Engineer District

## Salmon River

- 6.0080 A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO  
*J.J. PEEBLES*, Univ. of Idaho, Water Resources Research Inst.

## San Andreas Rift

- 3.0019 ENGINEERING SEISMOLOGY

## 3.0108 REGIONAL GEOLOGICAL FRAMEWORK, NORTH CENTRAL SAN ANDREAS FAULT - CALIFORNIA

- E.E. BRABB*, U.S. Dept. of the Interior, Geological Survey
- 3.0111 SAN ANDREAS FAULT - CALIFORNIA COOP  
*M.M. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 3.0112 SOUTHERN CALIFORNIA TECTONICS  
*M.M. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 3.0113 REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF BORREGO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (ABBREV)  
*M.M. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 3.0117 INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA  
*M.J. JOHNSTON*, U.S. Dept. of the Interior, Geological Survey
- 3.0120 MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA  
*D.S. MCCULLOCH*, U.S. Dept. of the Interior, Geological Survey
- 3.0129 AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA  
*S.W. STEWART*, U.S. Dept. of the Interior, Geological Survey
- 3.0130 SEISMIC SOURCE STUDIES - CALIFORNIA  
*W. THATCHER*, U.S. Dept. of the Interior, Geological Survey
- 3.0133 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA  
*R.E. WALLACE*, U.S. Dept. of the Interior, Geological Survey
- 3.0134 CALIFORNIA M/EQ NET  
*R.L. WESSON*, U.S. Dept. of the Interior, Geological Survey
- 3.0138 STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA  
*A. NUR*, Stanford University, School of Earth Sciences
- 3.0139 CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES  
*C.R. ALLEN*, Calif. Inst. of Technology, Graduate School
- 3.0156 ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLLISTER, CALIFORNIA  
*T.H. ROGERS*, U.S. Dept. of Commerce, Earthquake Mechanism Lab.
- 3.0173 EARTHQUAKES AND ACTIVE FAULTS  
*J.S. DODD*, U.S. Dept. of the Interior, Bureau of Reclamation
- 3.0180 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
*P.P. ORKILD*, U.S. Dept. of the Interior, Geological Survey
- 9.0001 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA  
*T.W. DIBBLEE*, U.S. Dept. of the Interior, Geological Survey

## San Fernando Valley

**BEHAVIOR OF UNDERGROUND BOX CON-  
CRETE IN THE SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 1971**

**ADILEK**, U.S. Army, Engineer District

**VAN NORMAN RESERVOIRS AREA, CALIFOR-**

**ERKES**, U.S. Dept. of the Interior, Geological Survey

**THE SAN FERNANDO EARTHQUAKE SOILS  
GEOLOGIC INVESTIGATIONS IN RELATION  
TO HIGHWAY DAMAGE**

**RYSOCK**, State Materials & Res. Dept.

**INVESTIGATION OF GROUND MOTION-  
RESPONSE RELATIONSHIPS FOR RESIDENTIAL  
BUILDINGS IN GLENDALE, CALIFORNIA- SAN FER-  
NANDO EARTHQUAKE, FEBRUARY 1971**

**HOOMAND**, John A. Blume & Associates

**RESPONSE OF TWO IDENTICAL SEVEN-STORY  
STRUCTURES TO THE SAN FERNANDO  
EARTHQUAKE OF FEBRUARY 9, 1971**

**HEEMAN**, John A. Blume & Associates

**OBSERVATIONS OF DAMAGE TO GLENDALE  
SWIMMING POOLS, MOBILE HOMES, AND COM-  
MERCIAL BUILDINGS RESULTING FROM SAN FER-  
NANDO EARTHQUAKE OF 1971**

**ELSON**, John A. Blume & Associates

**DAMAGE SURVEY, SAN FERNANDO  
EARTHQUAKE OF FEBRUARY 9, 1971**

**TOWN**, John A. Blume & Associates

**ENGINEERING SEISMOLOGY**

**LLDREDGE**, U.S. Dept. of Commerce, Environ.  
Research Laboratories

**PERFORMANCE OF SINGLE FAMILY  
BUILDINGS IN THE SAN FERNANDO  
EARTHQUAKE OF FEBRUARY 9, 1971**

**CCCLURE**, U.S. Dept. of Hou. & Urb. Dev., Off. of  
Policy Dev. & Res.

**RESPONSE OF POWER SYSTEMS TO THE SAN  
FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY  
1971**

**RIFF**, Purdue University, School of Aeronautics

**DAMAGE STATISTICS FOR HIGH-RISE  
BUILDINGS IN THE VICINITY OF THE SAN FER-  
NANDO EARTHQUAKE**

**HITTMAN**, Mass. Inst. of Technology, School of En-  
gineering

**NATIONAL INFORMATION SERVICE FOR  
EARTHQUAKE ENGINEERING, SAN FERNANDO  
AREA PROCESSING**

**UDSON**, Calif. Inst. of Technology, School of En-  
gineering

**COMPARISONS OF SEISMIC ANALYSES OF  
IDENTICAL STRUCTURES BASED ON SEISMO-  
GRAMS FROM THE SAN FERNANDO EARTHQUAKE  
(PRELIMINARY)**

**H.B. SEED**, Univ. of California, Earthquake Engin. Res. Ctr.

**3.0098 ANALYTICAL INVESTIGATIONS OF THE  
SEISMIC RESPONSE OF LONG MULTIPLE SPAN  
HIGHWAY BRIDGES**

**W. TSENG**, Univ. of California, Earthquake Engin. Res. Ctr.

**3.0101 RECOMMENDATIONS DEVELOPED FROM RE-  
PORTS OF THE EARTHQUAKE COMMISSION AND  
EARTHQUAKE TASK FORCES - SAN FERNANDO  
EARTHQUAKE (ABBREVIATED)**

**UNKNOWN**, Los Angeles Co. Bd. of Supvrs.

**3.0102 OPTIMIZATION OF WATER RESOURCE  
SYSTEMS INCORPORATING EARTHQUAKE RISK**

**C.M. DUKE**, Univ. of California, School of Engineering

**3.0139 CALTECH SEISMIC NETWORK AND SAN FER-  
NANDO EARTHQUAKE STUDIES**

**C.R. ALLEN**, Calif. Inst. of Technology, Graduate School

**3.0145 STRAINS AND TILTS ASSOCIATED WITH THE  
SAN FERNANDO EARTHQUAKE**

**P. JUNGELS**, Calif. Inst. of Technology, Seismological  
Laboratory

**3.0148 ANALYSIS OF THE EARTHQUAKE RESPONSE  
OF A NINE-STORY STEEL FRAME BUILDING DURING  
THE SAN FERNANDO EARTHQUAKE**

**J.H. WOOD**, Calif. Inst. of Technology, Earthquake Engin.  
Res. Lab.

**3.0151 THE SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 AND PUBLIC POLICY**

**UNKNOWN**, State Legislature

**3.0244 PREDICTED SAN FERNANDO EARTHQUAKE  
SPECTRA- GLENDALE AREA**

**J.R. MURPHY**, Environmental Res. Corporation

**9.0029 GEOLOGY OF THE POINT DUME QUADRAN-  
GLE AND THE LOS ANGELES COUNTY PART OF  
THE TRIUNFO PASS QUADRANGLE, LOS ANGELES  
CO. COOPERATIVE, CALIFORNIA**

**R.H. CAMPBELL**, U.S. Dept. of the Interior, Geological Sur-  
vey

## San Francisco Bay

**3.0109 ENVIRONMENTAL GEOLOGY OF THE SAN  
FRANCISCO BAY REGION - CALIFORNIA**

**E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey

**3.0118 ENGINEERING SEISMOLOGY - CALIFORNIA**

**W.B. JOYNER**, U.S. Dept. of the Interior, Geological Survey

**3.0159 ENG AFTERSHOCK STUDIES - CALIFORNIA**

**S.T. ALGERMISSEN**, U.S. Dept. of Commerce, Environ.  
Research Laboratories

**3.0161 A STUDY OF EARTHQUAKE LOSSES IN THE  
SAN FRANCISCO BAY AREA - DATA AND ANALY-  
SIS**

**UNKNOWN**, U.S. Dept. of Commerce, Environ. Research  
Laboratories

**6.0298 USE OF ERTS-1 DATA - SUMMARY REPORT OF  
WORK ON TEN TASKS**

**F.J. THOMSON**, Environmental Res. Inst. Mich.

- 16.0054 ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT

D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey

- 16.0055 GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA

E.H. PAMPEYAN, U.S. Dept. of the Interior, Geological Survey

- 16.0056 SOIL ENGINEERING RESEARCH - CALIFORNIA

F.L. YOUNG, U.S. Dept. of the Interior, Geological Survey

- 16.0075 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

### San Joaquin Valley

- 10.0019 LAND SUBSIDENCE STUDIES IN THE SAN JOAQUIN VALLEY - CALIFORNIA

J.F. POLAND, U.S. Dept. of the Interior, Geological Survey

### San Juan Mountains

- 1.0008 DEVELOPMENT OF METHODOLOGY FOR EVALUATION AND PREDICTION OF AVALANCHE HAZARD IN THE SAN JUAN MOUNTAINS OF COLORADO

J.D. IVES, Univ. of Colorado, Inst. of Arctic & Alpine Res.

### San Pablo Bay

- 6.0178 NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA

J.P. KENNY, Council on Intergov. Relations

### Sangamon River

- 6.0086 OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS

H.M. KARARA, Univ. of Illinois, School of Engineering

### Santa Ana River

- 6.0039 EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA

M.W. BUSBY, U.S. Dept. of the Interior, Geological Survey

- 6.0172 SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT

UNKNOWN, U.S. Army, Engineer District

CO. COOPERATIVE, CALIFORNIA  
R.H. CAMPBELL, U.S. Dept. of the Interior, Geological Survey

- 9.0034 MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA

R.F. YERKES, U.S. Dept. of the Interior, Geological Survey

### Sevier Fault

- 3.0276 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH

S.H. WARD, Univ. of Utah, School of Mines

### Sierra Nevada Mountains

- 3.0111 SAN ANDREAS FAULT - CALIFORNIA COOP

M.M. CLARK, U.S. Dept. of the Interior, Geological Survey

- 5.0005 GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA MIXED-CONIFER TYPE

L.R. GREEN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.

- 5.0040 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION

M.J. SCHROEDER, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Expt. Sta.

### Silver Valley

- 6.0003 SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS

C.D. HARVEY, Boise State College, School of Arts

### Skagit River

- 11.0007 PHYSICAL EVALUATION OF CLOUD SEEDING TECHNIQUES FOR MODIFYING OROGRAPHIC SNOWFALL - THE CASCADE PROJECT

P.V. HOBBS, Univ. of Washington, School of Arts

### Skokomish River

- 6.0404 FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON

J.E. CUMMANS, U.S. Dept. of the Interior, Geological Survey

## Snake River

VER PLAIN, PART A - REGIONAL  
IDHO  
ept. of the Interior, Geological Survey  
OLE FLOOD CONTROL PROJECT  
Army, Corps of Engineers  
VER BASIN, PART F - SOUTHERN  
VEST MARGIN - IDAHO  
t. of the Interior, Geological Survey

## Souris River

REGULATION EFFECTS OF THE  
RESERVOIR FROM THE DAM  
TO WESTHOPE, NORTH DAKOTA  
U.S. Dept. of the Interior, Geological Sur-

## South Carolina

ROLINA SEISMICITY PROGRAM  
ept. of the Interior, Geological Survey  
G PLAN FOR FIRE WEATHER SER-  
H CAROLINA  
Dept. of Commerce, Natl. Weather Ser-

URANCE STUDY  
U.S. Dept. of Commerce, National

CREEK WATERSHED PROJECT,  
INA  
Dept. of Agriculture, Soil Conservation

TION AND ANALYSIS OF FLOODS  
L DRAINAGE AREAS IN SOUTH

E, U.S. Dept. of the Interior, Geological

BEACH, S.C. - COMPREHENSIVE  
T PLAN  
Planning & Grants Div.

AIN INUNDATION  
Dept. of the Interior, Geological Survey

REQUENCY OF SMALL AREAS -  
INA  
Dept. of the Interior, Geological Survey

CAROLINA HURRICANES OR A  
LISTING OF TROPICAL CYCLONES  
FFECTED SOUTH CAROLINA  
Dept. of Commerce, Natl. Weather Ser-

CHARLESTON

## LEXINGTON COUNTY

6.0197 HOLLOW CREEK WATERSHED PROJECT,  
SOUTH CAROLINA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

## MYRTLE BEACH

6.0363 MYRTLE BEACH, S.C. - COMPREHENSIVE  
DEVELOPMENT PLAN  
UNKNOWN, State Planning & Grants Div.

## SALUDA COUNTY

6.0197 HOLLOW CREEK WATERSHED PROJECT,  
SOUTH CAROLINA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

## South Dakota

4.0004 GEOLOGY OF THE RAPID CITY AREA, SOUTH  
DAKOTA  
J.M. CATTERMOLE, U.S. Dept. of the Interior, Geological  
Survey

4.0007 STABILIZATION OF EXPANSIVE CLAYS AND  
SHALES  
R.D. RICHMOND, U.S. Dept. of the Interior, Bureau of  
Reclamation

6.0056 BLACK HILLS FLOOD OF JUNE 9, 1972  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & At-  
mos. Admin.

6.0196 UNION CREEK WATERSHED PROJECT, SOUTH  
DAKOTA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

6.0219 INVESTIGATION AND ANALYSIS OF FLOOD  
HYDROGRAPHS FROM SMALL DRAINAGE BASINS  
IN SOUTH DAKOTA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0366 INVESTIGATION AND ANALYSIS OF FLOOD  
HYDROGRAPHS FROM SMALL DRAINAGE BASINS  
IN SOUTH DAKOTA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

9.0022 LANDSLIDE STUDIES IN SOUTH DAKOTA - RE-  
PORT NO.1 - LOCATION OF AREAS WITH HIGH  
LANDSLIDE POTENTIAL IN THE PIERRE SHALE  
J. SCULLY, State Geol. Survey

16.0002 CONSULTATIVE PSYCHIATRIC SERVICES TO  
INDIVIDUALS AND COMMUNITY GROUPS AND  
AGENCIES IN RAPID CITY, SOUTH DAKOTA  
C.L. KEENER, Unknown Inst. or Indiv. Grant

16.0020 TRAINING PROGRAM FOR CRISIS INTER-  
VENORS  
UNKNOWN, Western Health Systems Inc.

16.0086 ROLE PERFORMANCE IN THE OPERATING



**16.0002** CONSULTATIVE PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN RAPID CITY, SOUTH DAKOTA  
*C.L. KEENER*, Unknown Inst. or Indiv. Grant

#### UNION COUNTY

**6.0196** UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

### Southeast United States

**3.0202** A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES  
*L.T. LONG*, Georgia Inst. of Technology, School of Geosciences

**3.0277** SEISMICITY STUDIES OF THE CENTRAL APALACHIAN REGION  
*G.A. BOLLINGER*, Virginia Polytechnic Institute, School of Arts

### Southern United States

**5.0042** DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
*R.W. COOPER*, U.S. Dept. of Agriculture, S.E. Forest Experiment Station

**8.0015** HURRICANE CELIA REDEVELOPMENT  
*UNKNOWN*, U.S. Coastal Bend Reg. Comm.

### Southwest United States

**5.0002** PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
*A.W. LINDENMUTH*, Northern Ariz. University, U.S.D.A. Rky. Mtn. Forest Sta.

**6.0041** FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST  
*R.M. RICE*, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Exp. Sta.

### St. Lawrence River

**6.0130** REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK  
*J.A. FINCK*, State Dept. of Env. Conserv.

**6.0143** TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

**6.0337** APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN  
*J.W. KELLEY*, State University of New York, Agricultural Experiment Sta.

**8.0135** OPERATION AGNES  
*A. KUO*, Virginia Inst. of Marine Sci.

### Tampa Bay

**6.0071** ESTUARINE HYDROLOGY OF TAMPA BAY  
*C.R. GOODWIN*, U.S. Dept. of the Interior, Geological Survey

### Tanana River

**6.0053** CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION  
*C.P. LINDNER*, U.S. Army, Corps of Engineers

### Tennessee

**2.0024** METEOROLOGICAL DROUGHT IN TENNESSEE  
*J.V. VAIKSNORAS*, U.S. Dept. of Commerce, Natl. Weather Service

**3.0174** NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE  
*M.F. KANE*, U.S. Dept. of the Interior, Geological Survey

**3.0236** A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE  
*O.W. NUTTLI*, St. Louis University, Graduate School

**3.0269** EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE  
*F. KELLOGG*, Mississippi Ark. Tenn. Council

**3.0270** REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA  
*UNKNOWN*, Mississippi Ark. Tenn. Council

**6.0055** HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

**6.0147** FLOOD INVESTIGATIONS - TENNESSEE  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE  
 W.N., U.S. Dept. of the Interior, Geological Survey  
 INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE  
 W.B.BEN, U.S. Dept. of the Interior, Geological Survey  
 TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN UNITED STATES (1880-1970)  
 KSNORAS, U.S. Dept. of Commerce, Natl. Weather Service  
 MISSISSIPPI DELTA TORNADOES OF FEBRUARY 1, 1971 - A REPORT TO THE ADMINISTRATOR  
 W.N., U.S. Dept. of Commerce, Natl. Oceanic & Atmospheric Admin.  
 MANAGEMENT OF INSURABLE RISK  
 WIDENHOP, Univ. of Tennessee, Agricultural Experiment Station  
 DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION  
 W.SHEN, Urban Obs. of Met. Nashville

DAVIDSON COUNTY  
 FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE  
 W.N., U.S. Dept. of the Interior, Geological Survey

DECATUR COUNTY  
 CREECH RIVER WATERSHED PROJECT - TENNESSEE  
 W.H., U.S. Tennessee Valley Auth.

DICKSON COUNTY  
 HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE  
 W.N., U.S. Dept. of Agriculture, Soil Conservation Service

HENDERSON COUNTY  
 CREECH RIVER WATERSHED PROJECT - TENNESSEE  
 W.H., U.S. Tennessee Valley Auth.

HUMPHREYS COUNTY  
 HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE

SEE  
 UNKNOWN, State Planning Commission

## NASHVILLE

- 16.0023 DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION  
 C.E. GOSHEN, Urban Obs. of Met. Nashville

## NASHVILLE COUNTY

- 6.0370 FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE  
 L.C. CONN, U.S. Dept. of the Interior, Geological Survey

## Tennessee River

- 6.0367 DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE  
 E.H. LESSENE, U.S. Tennessee Valley Auth., Div. of Water Cont. Plan

## Texas

- 2.0008 PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV)  
 T.J. HENDERSON, Atmospherics Incorporated
- 3.0125 SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS  
 J.C. ROLLER, U.S. Dept. of the Interior, Geological Survey
- 5.0022 EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS  
 H.A. WRIGHT, Texas Technological University, School of Agriculture
- 6.0061 PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS  
 E.E. SCHROEDER, U.S. Dept. of the Interior, Geological Survey
- 6.0100 RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS  
 UNKNOWN, U.S. Army, Engineer District
- 6.0148 COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
 UNKNOWN, State Div. of Comp. Planning
- 6.0149 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS  
 UNKNOWN, U.S. Dept. of the Interior, Geological Survey

- TEXAS  
D.R. BASCO, Texas A & M University System, School of Engineering
- 6.0152 PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS  
UNKNOWN, U.S. Army, Engineer District
- 6.0201 CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0372 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS  
J.W. BOARD, U.S. Dept. of the Interior, Geological Survey
- 6.0373 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN  
J.D. BOHN, U.S. Dept. of the Interior, Geological Survey
- 6.0374 EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA  
G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Survey
- 6.0375 HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS  
W.H. GOINES, U.S. Dept. of the Interior, Geological Survey
- 6.0376 EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA  
S.L. JOHNSON, U.S. Dept. of the Interior, Geological Survey
- 6.0377 URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0379 WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV)  
UNKNOWN, Texas A & M University System, Water Resources Institute
- 6.0380 OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY  
UNKNOWN, U.S. Coastal Bend Reg. Comm.
- 6.0381 SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS  
UNKNOWN, Texoma Regional Planning Comm.
- 6.0382 URBAN HYDROLOGY STUDY, DALLAS, TEXAS  
G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Survey
- 6.0383 URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS  
R.B. HAMPTON, U.S. Dept. of the Interior, Geological Survey
- 6.0384 URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS  
B.C. MASSEY, U.S. Dept. of the Interior, Geological Survey
- 6.0385 PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT  
G.L. WILLIAMS, Lockwood Andrews & Newman Inc.
- 6.0386 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS
- 6.0387 VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS  
D.M. WELLS, Texas Technological University, Water Resources Center
- 6.0388 RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS  
W.G. KNISEL, U.S. Dept. of Agriculture, Blackland Experiment Watershed
- 6.0389 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS  
R.D. STEGER, U.S. Dept. of the Interior, Geological Survey
- 8.0013 TEXAS COAST HURRICANE SURGE MODEL STUDIES  
N.J. BROGDON, U.S. Army, Estuaries Division
- 8.0038 GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
W.H. BOBB, U.S. Army, Waterways Experiment Station
- 8.0039 GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
W.H. BOBB, U.S. Army, Waterways Experiment Station
- 8.0045 GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV)  
R.A. SAGER, U.S. Army, Waterways Experiment Station
- 8.0046 GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
R.A. SAGER, U.S. Army, Waterways Experiment Station
- 8.0049 THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST  
T.W. BILHORN, Gulf Univ. Res. Consortium
- 9.0023 A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS  
T.G. ABRAMS, Univ. of Texas, Ctr. For Highway Research
- 10.0001 COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS  
W.L. TROCK, Texas A & M University System, School of Agriculture
- 10.0011 LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
R.K. GABRYSCH, U.S. Dept. of the Interior, Geological Survey
- 10.0012 LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS  
R.K. GABRYSCH, U.S. Dept. of the Interior, Geological Survey
- 10.0013 CONTINUING QUANTITATIVE GROUNDWATER STUDIES IN THE HOUSTON DISTRICT  
A.G. WINSLOW, U.S. Dept. of the Interior, Geological Survey
- 10.0032 CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA  
A.P. DEFLACHE, Lamar University, School of Engineering

LUBBOCK TORNADO - A SURVEY OF BUILD-  
DAMAGE IN AN URBAN AREA - TEXAS

AMES, U.S. Dept. of Commerce, Building Research

NUMERICAL ANALYSIS OF TORNADO WIND  
S ON BUILDINGS - TEXAS

ENTRY, U.S. Atomic Energy Commission, Los  
Scientific Lab.

PAPERS ON OKLAHOMA THUNDERSTORMS,  
L 29-30, 1970

RNES, U.S. Dept. of Commerce, Environ. Research  
Laboratory

IMPACT OF THE LUBBOCK STORM ON RE-  
AL SYSTEMS - TEXAS

NOR, Texas Technological University, School of En-  
gineering

PROPERTIES AND STABILITY OF A TEXAS  
RIER BEACH INLET

SON, Texas A & M University System, Graduate  
School

INVESTIGATION OF SHORELINE CHANGES AT  
GENT BEACH, TEXAS

EELIG, Texas A & M University System, Graduate  
School

TEXAS BARRIER ISLANDS

INTER, U.S. Dept. of the Interior, Geological Survey

THE WICHITA FALLS CONSORTIUM PHASE I  
ORT - VOLUME III - ANALYSIS OF MUNICIPAL

VITIES - SECTION IV - PUBLIC SAFETY  
SYSTEM

OWN, Unknown Inst. or Indiv. Grant

ENVIRONMENTAL GEOLOGIC ATLAS OF THE  
AS COASTAL ZONE, GALVESTON-HOUSTON

A  
SHER, Univ. of Texas, Bureau of Economic Geology

#### ABILENE

EFFECT OF PRESCRIBED BURNING ON WATER  
D AND QUALITY FROM BRUSH INFESTED  
DS - TEXAS

RIGHT, Texas Technological University, School of  
Culture

#### AUSTIN

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS  
ARD, U.S. Dept. of the Interior, Geological Survey

URBAN HYDROLOGY STUDIES OF SELECTED  
AS IN TEXAS - DALLAS, AUSTIN

HN, U.S. Dept. of the Interior, Geological Survey

#### BAYTOWN

LAND-SURFACE SUBSIDENCE, BAYTOWN  
A, TEXAS

ABRYSCH, U.S. Dept. of the Interior, Geological Sur-

#### COOKE COUNTY

6.0381 SOIL AND WATER CONSERVATION NEEDS IN-  
VENTORY, COOKE, GRAYSON AND FANNIN  
COUNTIES, TEXAS

UNKNOWN, Texoma Regional Planning Comm.

#### DALLAS

6.0373 URBAN HYDROLOGY STUDIES OF SELECTED  
AREAS IN TEXAS - DALLAS, AUSTIN

J.D. BOHN, U.S. Dept. of the Interior, Geological Survey

6.0374 EFFECTS OF URBANIZATION ON FLOODS IN  
THE DALLAS, TEXAS METROPOLITAN AREA

G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Sur-  
vey

6.0382 URBAN HYDROLOGY STUDY, DALLAS, TEXAS

G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Sur-  
vey

#### DALLAS COUNTY

6.0384 URBAN HYDROLOGY STUDY - DALLAS COUN-  
TY, TEXAS

B.C. MASSEY, U.S. Dept. of the Interior, Geological Survey

#### FANNIN COUNTY

6.0381 SOIL AND WATER CONSERVATION NEEDS IN-  
VENTORY, COOKE, GRAYSON AND FANNIN  
COUNTIES, TEXAS

UNKNOWN, Texoma Regional Planning Comm.

#### FT. WORTH

6.0383 URBAN HYDROLOGY STUDY - FORT WORTH,  
TEXAS

B.B. HAMPTON, U.S. Dept. of the Interior, Geological Sur-  
vey

#### GALVESTON

8.0013 TEXAS COAST HURRICANE SURGE MODEL  
STUDIES

N.J. BROGDON, U.S. Army, Estuaries Division

10.0032 CONTROL OF LAND SUBSIDENCE IN THE  
TEXAS GULF COAST AREA

A.P. DELFLACHIE, Lamar University, School of Engineering

16.0104 ENVIRONMENTAL GEOLOGIC ATLAS OF THE  
TEXAS COASTAL ZONE, GALVESTON-HOUSTON  
AREA

W.L. FISHER, Univ. of Texas, Bureau of Economic Geology

# HAMILTON

- 6.0148 COMPREHENSIVE PLAN, CITY OF HAMILTON,  
TEXAS  
TANNOBA, State Div. of Comp. Planning

# HOUSTON

- 6.0376 EFFECTS OF URBANIZATION ON FLOODS IN  
THE HOUSTON, TEXAS METROPOLITAN AREA  
ST. JOHNSON, U.S. Dept. of the Interior, Geological Sur-  
vey
- 6.0386 URBAN HYDROLOGY STUDY - HOUSTON,  
TEXAS  
ST. JOHNSON, U.S. Dept. of the Interior, Geological Sur-  
vey
- 10.0001 COSTS OF LAND SUBSIDENCE IN THE  
HOUSTON-GALVESTON AREA, TEXAS  
W. L. TROCK, Texas A & M University System, School of  
Agriculture
- 10.0013 CONTINUING QUANTITATIVE GROUND-  
WATER STUDIES IN THE HOUSTON DISTRICT  
A. G. WINSLOW, U.S. Dept. of the Interior, Geological Sur-  
vey
- 10.0032 CONTROL OF LAND SUBSIDENCE IN THE  
TEXAS GULF COAST AREA  
A. P. DELFLACHE, Lamar University, School of Engineering
- 16.0104 ENVIRONMENTAL GEOLOGIC ATLAS OF THE  
TEXAS COASTAL ZONE, GALVESTON-HOUSTON  
AREA  
B. L. FISHER, Univ. of Texas, Bureau of Economic Geology

# HUDSPETH COUNTY

- 6.0201 CORNUDAS, NORTH AND CULP DRAWS  
WATERSHED, HUDSPETH COUNTY, TEXAS, AND  
OTERO COUNTY, NEW MEXICO  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation  
Service

# LUBBOCK

- 12.0004 LUBBOCK TORNADO - A SURVEY OF BUILD-  
ING DAMAGE IN AN URBAN AREA - TEXAS  
N. F. SOMES, U.S. Dept. of Commerce, Building Research  
Div.
- 12.0040 IMPACT OF THE LUBBOCK STORM ON RE-  
GIONAL SYSTEMS - TEXAS  
J. E. MINOR, Texas Technological University, School of En-  
gineering

# PALACIOS

- 6.0385 PALACIOS COMPREHENSIVE PLAN - PHASE 2.  
SUMMARY REPORT  
G. L. WILLIAMS, Lockwood Andrews & Newman Inc.

# PORT ARTHUR

- 6.0152 PORT ARTHUR HURRICANE FLOOD PROTEC-  
TION, PORT ARTHUR AND VICINITY, TEXAS  
UNKNOWN, U.S. Army, Engineer District

# SAN ANTONIO

- 6.0377 URBAN HYDROLOGY STUDY - SAN ANTONIO,  
TEXAS  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0379 WATER FOR TEXAS - URBAN WATER  
RESOURCES PLANNING AND MANAGEMENT - THE  
PROCEEDINGS OF THE ANNUAL CONFERENCE  
HELD AT SAN ANTONIO (ABBREVI)  
UNKNOWN, Texas A & M University System, Water  
Resources Institute
- 6.0389 URBAN HYDROLOGY STUDY, SAN ANTONIO,  
TEXAS  
R. D. STEGER, U.S. Dept. of the Interior, Geological Survey

# SEABROOK

- 10.0012 LAND-SURFACE SUBSIDENCE, TEXAS CITY  
AND SEABROOK AREAS, TEXAS  
R. K. GABRYSCH, U.S. Dept. of the Interior, Geological Sur-  
vey

# TEXAS CITY

- 8.0013 TEXAS COAST HURRICANE SURGE MODEL  
STUDIES  
N. J. BROGDON, U.S. Army, Estuaries Division
- 10.0012 LAND-SURFACE SUBSIDENCE, TEXAS CITY  
AND SEABROOK AREAS, TEXAS  
R. K. GABRYSCH, U.S. Dept. of the Interior, Geological Sur-  
vey

# WICHITA FALLS

- 16.0103 THE WICHITA FALLS CONSORTIUM PHASE I  
REPORT - VOLUME III - ANALYSIS OF MUNICIPAL  
ACTIVITIES - SECTION IV - PUBLIC SAFETY  
SUBSYSTEM  
UNKNOWN, Unknown Inst. or Individ. Grant

## Treasure Island

- 15.0015 COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA  
UNKNOWN, U.S. Army, Coastal Engin. Res. Center

## Uinta Basin

- 10276 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH  
S.H. WARD, Univ. of Utah, School of Mines

## Union Creek

- 0196 UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

## Utah

- 1020 SEISMIC RISK - FDAA - WASHINGTON AND UTAH  
T. ALGERMISSEN, U.S. Dept. of the Interior, Geological Survey  
127 CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO  
C. SAVAGE, U.S. Dept. of the Interior, Geological Survey  
163 RISK MAPS AND FIELD INVESTIGATIONS  
T. ALGERMISSEN, U.S. Dept. of the Interior, Geological Survey  
166 GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO  
P. MICKEY, U.S. Dept. of the Interior, Geological Survey  
80 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
P. ORKILD, U.S. Dept. of the Interior, Geological Survey  
76 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH  
S.H. WARD, Univ. of Utah, School of Mines  
31 STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY

- 6.0031 STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY  
J.P. RILEY, Utah State University, Utah Ctr. For Wtr. Resour. Res

## SALT LAKE COUNTY

- 6.0031 STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY  
J.P. RILEY, Utah State University, Utah Ctr. For Wtr. Resour. Res

## Ventura Basin

- 3.0264 AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA  
R.S. YEATS, Ohio University, School of Arts

## Vermont

- 6.0296 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT  
C.G. JOHNSON, U.S. Dept. of the Interior, Geological Survey  
15.0038 ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT  
W.P. WAGNER, Univ. of Vermont, State Resources Res. Center

## Virginia

- 6.0001 DISASTER INVESTIGATIONS  
C.G. CULVER, U.S. Dept. of Commerce, Natl. Bureau of Standards  
6.0180 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA  
E.M. MILLER, U.S. Dept. of the Interior, Geological Survey  
6.0396 NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA  
D.N. CONTRACTOR, Virginia Polytechnic Institute, School of Engineering  
6.0397 PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA  
L.A. SHABMAN, Virginia Polytechnic Institute, School of Agriculture  
6.0398 FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT

- 6.0001 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA  
*E.P. ADAMS*, U.S. Dept. of the Interior, Geological Survey
- 6.0401 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA  
*E.P. ADAMS*, U.S. Dept. of the Interior, Geological Survey
- 6.0402 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND AND VIRGINIA  
*E. CAMDELL*, Univ. of Delaware, School of Arts
- 6.0605 ATLANTIC HURRICANE SEASON OF 1972  
*P.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service
- 6.0609 ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES  
*J.E. SCHUBEL*, Johns Hopkins University, Graduate School
- 6.0123 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972  
*R.M. DE ANGELIS*, U.S. Dept. of Commerce, Natl. Climatic Center
- 6.0134 FORECASTING STORM-INDUCED BEACH CHANGES ALONG VIRGINIA'S OCEAN COAST  
*B. HARRISON*, Virginia Inst. of Marine Sci.
- 6.0036 DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA  
*D.H. FOOTE*, Univ. of California, School of Physical Sciences
- 15.0011 VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION  
*UNKNOWN*, U.S. Army, Engineer District
- 15.0039 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

#### FAIRFAX COUNTY

- 6.0001 DISASTER INVESTIGATIONS  
*C.G. CULVER*, U.S. Dept. of Commerce, Natl. Bureau of Standards
- 6.0382 URBAN HYDROLOGY STUDY, DALLAS, TEXAS  
*G.R. DEMPSTER*, U.S. Dept. of the Interior, Geological Survey
- 6.0398 FLOOD DAMAGE ABATEMENT. FEDERAL ASSISTANCE TO LOCAL GOVERNMENT  
*B.R. WALKER*, Virginia Polytechnic Institute, Water Resources Research Ctr.
- 6.0400 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY  
*P.L. MOITE*, U.S. Dept. of the Interior, Geological Survey
- 6.0401 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA  
*E.P. ADAMS*, U.S. Dept. of the Interior, Geological Survey

#### Wabash River

- 6.0088 INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL  
*T.P. CHANG*, Purdue University, Water Resources Research Ctr.
- 6.0271 WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION  
*G.H. TOEBES*, Purdue University, School of Civil Engin.

#### Walnut Creek

- 6.0195 KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0198 KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES  
*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service

#### Wareham River

- 8.0043 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION  
*E.C. MCNAIR*, U.S. Army, Waterways Experiment Station

#### Wasatch Mountains

- 3.0276 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH  
*S.H. WARD*, Univ. of Utah, School of Mines

#### Washington

- 1.0001 AVALANCHE STUDIES, 1971-1972  
*E.R. LACHAPPELLE*, State Dept. of Highways
- 1.0002 NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS  
*E.R. LACHAPPELLE*, Univ. of Washington, School of Arts
- 1.0006 AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT  
*E.R. LACHAPPELLE*, State Dept. of Highways

AND GEOLOGY OF THE  
 TERN OLYMPIC PENINSULA, WASHING-  
 U.S. Dept. of the Interior, Geological Survey  
 SOUND, WASHINGTON, EARTHQUAKE  
 MANTLE STRUCTURE BENEATH THE  
 TERN UNITED STATES  
 E, Calif. Inst. of Technology, Seismological  
 BODY OF SEISMICITY AND CRUSTAL  
 E IN WESTERN WASHINGTON USING A  
 LEMETRY NETWORK  
 V, Univ. of Washington, School of Arts  
 NG STANDARDS AND THE  
 KE HAZARD FOR THE PUGET SOUND

iv. of Washington, School of Engineering  
 STUDY OF FLOOD PLAIN MANAGE-  
 WASHINGTON  
 V, Washington State University, School of En-  
 PROFILES AND INUNDATED AREAS  
 THE LOWER NISQUALLY RIVER,  
 ON  
 S, U.S. Dept. of the Interior, Geological Sur-  
 PROFILES AND INUNDATED AREAS  
 E SKOKOMISH RIVER, WASHINGTON  
 S, U.S. Dept. of the Interior, Geological Sur-  
 ATION OF CRITERIA FOR LANDSLIDE  
 AS PRESENTED IN THE U.S.G.S.  
 J.S. Dept. of the Interior, Bureau of Reclama-

CAL EVALUATION OF CLOUD SEEDING  
 ES FOR MODIFYING OROGRAPHIC  
 - THE CASCADE PROJECT  
 Univ. of Washington, School of Arts  
 RATE OF MAXIMUM WIND SPEEDS OF  
 ES IN THREE NORTHWESTERN STATES -  
 EGON, WASHINGTON  
 Univ. of Chicago, School of Physical Sciences  
 LLITE VOLCANO SURVEILLANCE -  
 AWAI AND WASHINGTON  
 S. Dept. of the Interior, Geological Survey  
 METER STUDIES OF CASCADE VOL-  
 WASHINGTON, OREGON AND CALIFOR-  
 V, U.S. Dept. of the Interior, Geological Sur-

S.W. SMITH, Univ. of Washington, School of Arts  
 16.0082 CLIMATOLOGICAL ASSESSMENT OF URBAN  
 EFFECTS ON PRECIPITATION - PART I  
 F.A. HUFF, State Water Survey

#### PULLMAN

6.0402 PILOT STUDY OF FLOOD PLAIN MANAGE-  
 MENT - WASHINGTON  
 J.F. ORSBORN, Washington State University, School of En-  
 gineering

### West Virginia

6.0015 ANALYSIS OF COAL REFUSE DAM FAILURE  
 MIDDLE FORK BUFFALO CREEK, SAUNDERS,  
 WEST VIRGINIA - VOLUME I  
 UNKNOWN, W.A. Wahler & Associates  
 6.0040 ANALYSIS OF COAL REFUSE DAM FAILURE  
 MIDDLE FORK BUFFALO CREEK, SAUNDERS,  
 WEST VIRGINIA - VOLUME II, APPENDICES  
 UNKNOWN, W.A. Wahler & Associates  
 6.0405 FLOOD HAZARD INFORMATION - BUFFALO  
 CREEK, LOGAN COUNTY, WEST VIRGINIA POST-  
 DISASTER CONDITIONS  
 UNKNOWN, U.S. Army, Corps of Engineers  
 6.0406 STORM CHARACTERISTICS AND RAINFALL IN-  
 TENSITY IN WEST VIRGINIA  
 W.H. DICKERSON, West Va. University, Water Research In-  
 stitute

#### LOGAN COUNTY

6.0405 FLOOD HAZARD INFORMATION - BUFFALO  
 CREEK, LOGAN COUNTY, WEST VIRGINIA POST-  
 DISASTER CONDITIONS  
 UNKNOWN, U.S. Army, Corps of Engineers

#### SAUNDERS

6.0015 ANALYSIS OF COAL REFUSE DAM FAILURE  
 MIDDLE FORK BUFFALO CREEK, SAUNDERS,  
 WEST VIRGINIA - VOLUME I  
 UNKNOWN, W.A. Wahler & Associates  
 6.0040 ANALYSIS OF COAL REFUSE DAM FAILURE  
 MIDDLE FORK BUFFALO CREEK, SAUNDERS,  
 WEST VIRGINIA - VOLUME II, APPENDICES  
 UNKNOWN, W.A. Wahler & Associates



- 6.0171 CLOUD SEEDING POTENTIAL FOR TWENTY RIVER BASINS  
R.D. ELLIOTT, North Amer. Weather Consult
- 6.0391 FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION  
P. WILLIAMS, U.S. Dept. of Commerce, Natl. Weather Service
- 14.0014 REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII  
R.L. SMITH, U.S. Dept. of the Interior, Geological Survey

## Weweantic River

- 8.0043 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION  
E.C. MCNAIR, U.S. Army, Waterways Experiment Station

## Whitewater Creek

- 6.0206 WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

## Wichita Uplift

- 3.0236 A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE  
O.W. NUTTLI, St. Louis University, Graduate School

## Wisconsin

- 6.0162 LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW  
H. COHEN, Univ. of Alabama, Natural Resources Center
- 6.0248 FLOOD INUNDATION STUDY - WISCONSIN  
R.S. GRANT, U.S. Dept. of the Interior, Geological Survey
- 6.0398 FLOOD DAMAGE ABATEMENT: FEDERAL ASSISTANCE TO LOCAL GOVERNMENT  
W.R. WALKER, Virginia Polytechnic Institute, Water Resources Research Ctr.
- 6.0407 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II)  
D.C. CONGER, U.S. Dept. of the Interior, Geological Survey
- 6.0408 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN

- VOLUME IV - FLOOD PLAIN MANAGEMENT  
J.A. KUSLER, Univ. of Wisconsin, Water Resources Center
- 6.0411 NEW TECHNIQUES FOR DELINEATION OF FLOOD PLAIN HAZARD ZONES - SOIL SURVEYS  
G.B. LEE, Univ. of Wisconsin, Water Resources Center
- 7.0018 STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAIL STORMS - ALSO, WISCONSIN  
C.E. ANDERSON, Univ. of Wisconsin, School of Natural Sciences
- 9.0010 SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK  
UNKNOWN, Transportation Res. Board
- 11.0005 SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN  
R.W. HARMS, U.S. Dept. of Commerce, Natl. Weather Service

## Wyoming

- 3.0275 SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION  
R.B. SMITH, Univ. of Utah, School of Mines
- 6.0054 JACKSON HOLE FLOOD CONTROL PROJECT  
UNKNOWN, U.S. Army, Corps of Engineers
- 6.0060 INFLOW HYDROGRAPH STUDY - WYOMING  
R. CUSHMAN, U.S. Dept. of the Interior, Geological Survey
- 6.0414 FLOOD INVESTIGATIONS IN WYOMING  
H.W. LOWHAM, U.S. Dept. of the Interior, Geological Survey
- 6.0415 STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING  
UNKNOWN, U.S. Natl. Science Foundation
- 10.0033 DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING  
UNKNOWN, Unknown Inst. or Indiv. Grant

## JACKSON HOLE

- 6.0054 JACKSON HOLE FLOOD CONTROL PROJECT  
UNKNOWN, U.S. Army, Corps of Engineers

## LARAMIE COUNTY

- 7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING  
UNKNOWN, U.S. Natl. Science Foundation

## **Yellowstone National Park**

## **York River**

**.0275 SEISMICITY AND CONTEMPORARY TECTONICS  
OF THE YELLOWSTONE PARK-HEBGEN LAKE RE-  
GION**

*R.B. SMITH*, Univ. of Utah, School of Mines

**8.0135 OPERATION AGNES**

*A. KURO*, Virginia Inst. of Marine Sci.

**ce — Individual**  
*Counseling*  
*Insurance*  
*Services*  
*ore*  
*and Health Services*  
*Insurance*  
*Efforts*  
*on Assistance*  
*and Rescue*  
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*er Organization*  
**ce — Public**  
*ic Recovery*  
*Assessment and Analysis*  
*ic Assistance*  
*ion and Repair*  
*ications*  
*Removal*  
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*Services*  
*pression*  
*and Recreational Areas*  
*safety*  
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**Zone Management**  
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*bility Analysis*  
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*istance — Public*  
*ion and Repair*  
**ction Practices**  
*ard Reduction*  
**Counseling**  
*istance — Individual*  
**Insurance**  
*istance — Individual*  
**Assessment and Analysis**  
*istance — Public*  
*ic Recovery*  
**Removal**  
*istance — Public*  
*ion and Repair*

**Disaster Insurance**  
*See Hazard Reduction*  
**Vulnerability Analysis**  
**Disaster Mitigation**  
*Disaster Warning*  
**Emergency Communications**  
**Warning Systems**  
*Evacuation*  
**Emergency Routes and Plans**  
*Protective Measures*  
**Engineering and Construction**  
**Public Education**

**Disaster Warning**  
*See Disaster Mitigation*

**Economic Assistance**  
*See Assistance -- Public*  
**Economic Recovery**

**Economic Recovery**  
*See Assistance — Public*

**Emergency Communications**  
*See Disaster Mitigation*  
**Disaster Warning**

**Emergency Protective Measures**  
*See Assistance -- Public*  
**Restoration and Repair**

**Emergency Routes and Plans**  
*See Disaster Mitigation*  
**Evacuation**

**Engineering and Construction**  
*See Disaster Mitigation*  
**Protective Measures**

**Essential Services**  
*See Assistance — Public*  
**Restoration and Repair**

**Evacuation**  
*See Disaster Mitigation*

**Fire Suppression**  
*See Assistance — Public*  
**Restoration and Repair**

**Flood Plain Management**  
*See Hazard Reduction*  
**Vulnerability Analysis**

**Forecasting and Prediction**  
*See Hazard Reduction*  
**Vulnerability Analysis**

**Geophysical Modification**  
*See Hazard Reduction*  
**Vulnerability Analysis**

**Hazard Delineation**  
*See Hazard Reduction*  
**Vulnerability Analysis**

**Hazard Reduction**  
*Construction Practices*  
**Model Building Codes**  
**Standards**  
**Subdivision Regulations**

**Land Use and Development**  
**Land Use Practices**  
**Ordinances**  
**Subdivision Regulations**  
**Zoning**

**Legislation**

**Management Disaster Operations**

**Sociobehavioral Effects**

**Vulnerability Analysis**  
**Coastal Zone Management**  
**Disaster Insurance**  
**Flood Plain Management**  
**Forecasting and Prediction**  
**Geophysical Modification**  
**Hazard Delineation**  
**Preparedness Planning**  
**Research and Modeling**  
**Risk Mapping**

**Land Use and Development**  
*See Hazard Reduction*

**Land Use Practices**  
*See Hazard Reduction*  
**Land Use and Development**

**Legal Services**  
*See Assistance — Individual*

**Legislation**  
*See Hazard Reduction*

**Management Disaster Operations**  
*See Hazard Reduction*

*See Assistance — Individual*

**Model Building Codes**

*See Hazard Reduction*

**Construction Practices**

**Ordinances**

*See Hazard Reduction*

*Land Use and Development*

**Parks and Recreational Areas**

*See Assistance — Public*

*Restoration and Repair*

**Preparedness Planning**

*See Hazard Reduction*

*Vulnerability Analysis*

**Property Insurance**

*See Assistance — Individual*

**Protective Measures**

*See Disaster Mitigation*

**Public Education**

*See Disaster Mitigation*

*Protective Measures*

**Recovery Efforts**

*See Assistance — Individual*

**Relocation Assistance**

*See Assistance — Individual*

**Research and Modeling**

*See Hazard Reduction*

*Vulnerability Analysis*

**Restoration and Repair**

*See Assistance -- Public*

**Risk Mapping**

*See Hazard Reduction*

*Vulnerability Analysis*

**Search and Rescue**

*See Assistance — Individual*

**Sociobehavioral Effects**

*See Hazard Reduction*

**Standards**

*See Hazard Reduction*

*Construction Practices*

*Construction Practices*

*Land Use and Development*

**Temporary Housing**

*See Assistance — Individual*

**Transportation**

*See Assistance — Public*

*Restoration and Repair*

**Unemployment Assistance**

*See Assistance — Individual*

**Utilities**

*See Assistance -- Public*

*Restoration and Repair*

**Volunteer Organization**

*See Assistance -- Individual*

**Vulnerability Analysis**

*See Hazard Reduction*

**Warning Systems**

*See Disaster Mitigation*

*Disaster Warning*

**Zoning**

*See Hazard Reduction*

*Land Use and Development*

## Assistance - Individual

## CRISIS COUNSELING

KEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS ...6.0003

HEALTH SERVICES TO RESIDENTS OF FLOOD AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA ...6.0008

HEALTH SERVICES TO RESIDENTS OF FLOOD AREAS IN LUZERNE-WYOMING COUNTIES COMMONWEALTH OF PENNSYLVANIA ...6.0010

IMPACT AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER COMMONWEALTH OF PENNSYLVANIA ...6.0011

HEALTH SERVICES TO RESIDENTS OF FLOOD AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA ...6.0011

PROVIDING PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN SIOUX FALLS, SOUTH DAKOTA ...16.0002

PROGRAM FOR CRISIS INTERVENORS ...16.0003

## CROP INSURANCE

ESTIMATING CROP LOSSES DUE TO HAIL STATISTICAL ANALYSIS OF AGRICULTURAL ECONOMIC RESEARCH ...7.0001

IDENTIFICATION AND ANALYSIS OF FARM RISKS, FACTORS AND INSURANCE ...7.0002

ANALYSIS OF CROP-HAIL INSURANCE RECORDS FOR THE WESTERN COLORADO WITH RESPECT TO THE EFFECTS OF THE NATIONAL HAIL EXPERIMENT ...7.0003

PHYSIOLOGY AND MANAGEMENT ...7.0004

LEGAL AND INSTITUTIONAL CONSIDERATIONS OF INSURING HAIL ...7.0005

MODIFICATION IN NORTH DAKOTA ...7.0006

IDENTIFICATION OF INSURABLE RISK ...16.0021

## LEGAL SERVICES

THE LAW AND BEYOND - A QUEST FOR PROTECTION FROM HAZARDOUS PRODUCTS ...16.0004

## MASS CARE

TORNADO - THE VOICE OF THE PEOPLE IN DISASTER AND AFTER - A STUDY IN RESIDENTIAL INTEGRATION - TEXAS-(LUBBOCK?) ...12.0002

## MEDICAL AND HEALTH SERVICES

DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION ...16.0003

A SIMULATION MODEL FOR EMERGENCY MEDICAL SYSTEMS ...16.0006

MILITARY BLOOD BANKING (CIVIL DISASTERS) ...16.0007

PUBLIC HEALTH SERVICE DISASTER ASSISTANCE REPORT JULY 1967-JUNE 1970 ...16.0011

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES ...16.0013

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) ...16.0014

ANALYSIS OF EMERGENCY MEDICAL SERVICES COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL SUBDIVISIONS ...16.0016

SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY ...16.0018

EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES ...16.0022

DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023

## PROPERTY INSURANCE

EARTHQUAKES AND INSURANCE ...3.0001

STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A ...3.0002

FLOOD INSURANCE STUDY ...6.0005

FLOOD INSURANCE STUDY ...6.0006

CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...6.0007

PROCEEDINGS - COMMUNITY WORKSHOP ON FLOOD INSURANCE ...6.0012

EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA ...6.0013

RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID ...16.0019

LOCATING SYSTEM IDEAS FOR SEARCH AND  
RESCUE MISSION 16.0015

#### RELOCATION ASSISTANCE

FACTORS AFFECTING RELOCATION IN RESPONSE TO  
RESERVOIR DEVELOPMENT 6.0004

#### SEARCH AND RESCUE

EMERGENCY OPERATIONS SYSTEMS DEVELOPMENT -  
CIVIL DEFENSE RESCUE PHASE II 16.0001

GLOBAL RESCUE ALARM NETWORK (GRAN) 16.0009

SEARCH AND RESCUE COMMUNICATION--GLOBAL  
RESCUE ALARM NET (GRAN) 16.0010

HELICOPTER AMBULANCE SERVICE TO EMERGENCIES  
16.0012

THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL  
CARE SYSTEMS 16.0024

#### TEMPORARY HOUSING

DISASTER INVESTIGATIONS 6.0001

#### UNEMPLOYMENT ASSISTANCE

DELIVERING VOCATIONAL REHABILITATION SERVICES  
IN A DISASTER AREA 6.0014

#### VOLUNTEER ORGANIZATION

THE FEDERAL RESPONSE TO TROPICAL STORM  
AGNES, A REPORT TO THE SENATE COMMITTEE ON  
PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RE-  
LIEF 8.0001

THE SALVATION ARMY - ITS STRUCTURE, OPERA-  
TIONS, AND PROBLEMS IN DISASTERS 16.0017

#### Assistance - Public

#### ECONOMIC RECOVERY

##### *Damage Assessment & Analysis*

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY  
BRIDGES 3.0003

BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE  
SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971  
3.0005

VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
3.0006

PRELIMINARY INVESTIGATION OF STRUCTURAL  
DAMAGE FROM POINT MUGU, CALIFORNIA  
EARTHQUAKE OF FEBRUARY 21, 1973 3.0007

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS  
3.0010

THE SAN FERNANDO EARTHQUAKE SOILS AND  
GEOLOGIC INVESTIGATIONS IN RELATION TO  
HIGHWAY DAMAGE 3.0012

INVESTIGATION OF GROUND MOTION-DAMAGE RELA-  
TIONSHPIS FOR RESIDENTIAL BUILDINGS IN GLEN-  
DALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE,  
FEBRUARY 1 3.0013

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUC-  
TURES TO THE SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 3.0014

OBSERVATIONS OF DAMAGE TO GLENDALE  
SWIMMING POOLS, MOBILE HOMES, AND COMMER-  
CIAL BUILDINGS RESULTING FROM SAN FERNANDO  
EARTHQUAKE OF 1971 3.0015

SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW  
RISE BUILDINGS - COLORADO 3.0016

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 3.0017

STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA  
EARTHQUAKE OF JUNE 21, 1967 3.0018

ENGINEERING SEISMOLOGY 3.0019

PERFORMANCE OF SINGLE FAMILY DWELLINGS IN  
THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9,  
1971 3.0021

REPORT INTO SELECTED AREAS OF ECONOMIC IM-  
PACT OF THE CALIFORNIA EARTHQUAKE FOR THE  
OFFICE OF EMERGENCY PREPAREDNESS (ABBREV)  
3.0022

STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE  
STATISTICS, APPENDIX B 3.0024

THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF  
OCTOBER 1, 1969 3.0025

DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN  
THE VICINITY OF THE SAN FERNANDO  
EARTHQUAKE 3.0026

LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUC-  
TURES 3.0027

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA 5.0013

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME I 6.0015

A STATISTICAL SUMMARY OF THE CAUSE AND COST  
OF BRIDGE FAILURES 6.0016

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND IN-  
COME DISTRIBUTION EFFECTS IN RALSTON CREEK  
WATERSHEDS 6.0018

THE GENERATION OF FLOOD DAMAGE TIME  
SEQUENCES 6.0019

FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO  
6.0020

METEOROLOGICAL AND HYDROLOGICAL ANALYSIS  
OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD  
6.0021

SECTION WITH HYDROLOGIC AND RE-  
CAL PROCESSES IN THE OLYMPUS  
SALT LAKE COUNTY ...6.0031

INSTITUTIONAL CONSIDERATIONS OF  
AIL ...7.0007

DATA IN 1970-72 - ILLINOIS ...7.0008

DAMAGE WITH SPECIAL REFERENCE  
ARVA REGION OF DELAWARE, MARY-  
A ...8.0002

CANE SEASON OF 1972 ...8.0005

F ECONOMIC ANALYSES TO HUR-  
INGS TO RESIDENTIAL AND RETAIL.  
THE U. S. GULF OF MEXICO COASTAL  
5

D EXTENT OF STRUCTURAL DAMAGE  
RRRICANE CAMILLE ...8.0007

RRRICANE CAMILLE ON THE LAND-  
HE BRETON-CHANDELEUR ISLAND  
E EASTERN PORTION OF THE LOWER  
UTA ...8.0008

THE PHYSICAL AND GEOLOGICAL EF-  
PICAL STORM AGNES ON THE UPPER  
BAY AND SELECTED TRIBUTARIES

ULF COAST STRUCTURAL DAMAGE  
OM HURRICANE CAMILLE, AUGUST

RRRICANES OF THE UNITED STATES  
0016

SUBSIDENCE IN THE HOUSTON-GAL-  
TEXAS ...10.0001

TORNADO - A CASE STUDY - MISSOU-

IADO - A SURVEY OF BUILDING  
URBAN AREA - TEXAS ...12.0004

OF TWO TORNADIC STORMS - AN  
NSSL DATA ON APRIL 30, 1970 -  
TY, OKLAHOMA ...12.0007

ENCE MAPS ...12.0008

N TENNESSEE (1916-1970) WITH  
O NOTABLE TORNADO DISASTER IN  
ATES (1880-1970) ...12.0009

Y - PLAN FOR CALIFORNIA - THE NA-  
TITUDE, AND COSTS OF GEOLOGIC  
D RECOMMENDATIONS FOR THEIR  
BBREV) ...16.0025

RESEARCH ON NATURAL HAZARDS

STERS - SOME EMPIRICAL AND  
NSIDERATIONS ...16.0030

#### *Economic Assistance*

PI RIVER COMPREHENSIVE BASIN  
ME V, APPENDIX I - FLOOD CONTROL.

GRANT TO DESIGN A REBUILDING PLAN FOR GULF-  
PORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF  
HURRICANE CAMILLE, VOLUMES IV & V (ABBREV)  
...8.0012

#### *Communications*

A STUDY OF FOREST SERVICE TELECOMMUNICATIONS  
- VOLUME I - SUMMARY - MAIN STUDY RECOMMEN-  
DATIONS AND FINDINGS ...5.0010

ARIZONA 'EDDY' TORNADOES ...12.0010

A NATIONWIDE PROGRAM TO DEVELOP REGIONAL  
EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS  
...16.0029

EVALUATION OF EMERGENCY CALL SYSTEMS  
...16.0031

NATIONAL SEARCH AND RESCUE TELECOMMUNICA-  
TION SYSTEM PLAN (PINSARS) ...16.0032

COMMUNICATIONS IN NATURAL DISASTERS ...16.0033

#### *Debris Removal*

AVALANCHE STUDIES, 1971-1972 ...1.0001

NORTH CASCADES HIGHWAY SR-20 AVALANCHE  
ATLAS ...1.0002

SEISMIC RISK - FDAA - WASHINGTON AND UTAH  
...3.0020

MILTON SOUTH, MILTON NORTH AND TURBOT  
TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS,  
PENNSYLVANIA ...6.0027

DOWNTOWN URBAN RENEWAL PROJECT, WILKES-  
BARRE, PENNSYLVANIA ...6.0028

KINGSTON DISASTER URBAN RENEWAL PROJECT,  
BOROUGH OF KINGSTON, LUZERNE COUNTY,  
PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

DEBRIS CLEARING TIMES AFFECTING CRITICAL SUR-  
VIVAL ACTIONS ...16.0026

#### *Emergency Protective Measures*

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

REPORTS OF THE EARTHQUAKE TASK FORCES -  
RECOMMENDATIONS OF THE LOS ANGELES COUNTY  
EARTHQUAKE COMMISSION ...3.0004

REGIONAL CODE ENFORCEMENT - HANCOCK, HAR-  
RISON AND JACKSON COUNTIES, MISSISSIPPI ...8.0010

HURRICANE CELIA REDEVELOPMENT ...8.0015

NATURAL DISASTERS OPERATIONS PLANNING FOR  
SLOWLY DEVELOPING DISASTERS, VOLUME 1  
...8.0017

#### *Essential Services*

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK  
HAVEN, PENNSYLVANIA ...6.0024

MODEL CITIES ONE - URBAN RENEWAL PROJECT,  
READING, PENNSYLVANIA ...6.0025

DOCUMENTED CASE HISTORIES ... 5.0001  
 CRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ... 5.0002  
 GICAL CHARACTERISTICS OF CHAMISE AS A WIL-  
 AND FUEL - CALIFORNIA ... 5.0003  
 WEATHER AND FIRE BEHAVIOR AT THE 1968  
 NYON FIRE - CALIFORNIA ... 5.0004  
 ES FOR FUEL-BREAKS IN THE SIERRA NEVADA  
 KED-CONIFER TYPE ... 5.0005  
 ST FIRE BEHAVIOR - CALIFORNIA ... 5.0006  
 MANAGEMENT SYSTEMS ... 5.0007  
 TRACT FOR PARTIAL SUPPORT OF THE COMMIT-  
 E ON FIRE RESEARCH ... 5.0008  
 OYMENT OF AIR OPERATIONS IN THE FIRE SER-  
 ES - PROCEEDINGS OF A SYMPOSIUM, HELD AT  
 GONNE NATIONAL LABORATORY (ABBREV.) ... 5.0009  
 ELOPMENT OF NEW AND IMPROVED FIRE CON-  
 TROL METHODS FOR SOUTHERN FORESTS ... 5.0011  
 GREAT OAKLAND, LOS ANGELES, AND SAN  
 GO FIRES, SEPTEMBER 22 TO 29, 1970 ... 5.0012  
 CONTROL PLANNING AND FIRE PREVENTION IN  
 E NORTHEASTERN UNITED STATES ... 5.0014  
 ST FIRES IN MISSOURI ... 5.0015  
 WEATHER & BEHAVIOR OF THE LITTLE SIOUX  
 E - MINNESOTA ... 5.0016  
 ARCH AND DEVELOPMENT OF FIRE PREVENTION  
 HNOLOGY (FIRE PREVENTION) ... 5.0017  
 ICAL, CHEMICAL, AND PHYSIOLOGICAL PROPER-  
 S OF FUELS RELATED TO FIRE PHENOMENA ... 5.0018  
 ODS FOR THE PREVENTION AND CONTROL OF  
 HTNING FIRES ... 5.0019  
 ROL AND USE OF FIRE PARTICULARLY IN WIL-  
 NNESS, PARK, AND OTHER RECREATIONAL AREAS ... 5.0020  
 ODEL OF THE FORESTS OF GLACIER NATIONAL  
 K, MONTANA ... 5.0021  
 T OF PRESCRIBED BURNING ON WATER YIELD  
 O QUALITY FROM BRUSH INFESTED LANDS -  
 AS ... 5.0022

#### 1 FIRE SUPPRESSION

*reas*

IS ON THE CHES-

MODEL STUDIES

CAI, SERVICES &  
 AL YEAR 1974

#### Utilities

RESPONSE OF POWER SYSTEMS TO THE SAN FERNAN-  
 DO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971 ... 3.0023  
 IMPROVISING ELECTRIC POWER FROM INDUCTION  
 GENERATORS DURING PROLONGED POWER OU-  
 TAGES ... 16.0027

### Coastal Zone Management

*See Hazard Reduction*  
*Vulnerability Analysis*

### Communications

*See Assistance - Public*  
*Restoration & Repair*

### Construction Practices

*See Hazard Reduction*

### Crisis Counseling

*See Assistance - Individual*

### Crop Insurance

*See Assistance - Individual*

### Damage Assessment & Analysis

*See Assistance - Public*  
*Economic Recovery*

### Debris Removal

*See Assistance - Public*  
*Restoration & Repair*

### Disaster Insurance

*See Hazard Reduction*  
*Vulnerability Analysis*



N AND RELATED PROPERTIES OF  
O THE DETERMINATION OF SLAB  
ATION H042-EN ...1.0004

N AND RELATED PROPERTIES OF  
O THE DETERMINATION OF SLAB  
ATION ...1.0005

# *Emergency Communications*

E LOCAL STORMS OPERATIONS

IMPROVED COMMUNICATIONS SYSTEM  
EMERGENCY SERVICE DEPARTMENTS  
LOS ANGELES (ABBREV) ...16.0036  
TION OF GOVERNMENT AND NON-  
COMMUNICATIONS RESOURCES

# *Warning Systems*

QUAKE INFORMATION SERVICE

ANGER RATING ...5.0027

RED FOREST FIRE DETECTION  
OGY AS A MODERN TOOL FOR  
TECTION ...5.0029

F CENTERS OF COMBUSTION OF  
ONS BY THE METHOD FOR IR  
5.0030

FOR FIRE WEATHER SERVICE IN  
...5.0031

SATELLITE AND GROUND DATA IN  
TUDIES (ABBREV) ...5.0032

OLOGIC DATA FOR SHORT-TERM  
OODS ...6.0036

O OF JUNE 9, 1972 ...6.0056

ON FORESIGHT ...6.0057

AND SPECIALIZED FORECASTS

, COLLECTION VIA GEOSTATIONA-  
0103

PMENT - FLASH FLOOD ALARM

AL PRECIPITATION NETWORKS

DATA COLLECTION SYSTEM IN THE  
VER BASIN ...6.0143

NE OPERATION PLAN ...8.0020

CANE OPERATIONS PLAN 1974

THE DISASTER SURVEY TEAM ON  
GNES ...8.0022

NATIONAL EAST COAST WINTER STORMS - OPERA-  
TIONS PLAN ...12.0013

NATIONAL SEVERE LOCAL STORMS OPERATIONS  
PLAN - 1974 ...12.0014

MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971  
- A REPORT TO THE ADMINISTRATOR ...12.0015

SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUN-  
DERSTORM AND TORNADO WATCHES WITHIN THE  
NATIONAL WEATHER SERVICE, EASTERN REGION  
...12.0020

TORNADOES ...12.0021

OBSERVATIONS OF SEVERE STORMS ON 26 AND 28  
APRIL 1971 ...12.0022

TSUNAMI RESEARCH ...13.0004

TSUNAMI RESEARCH ...13.0005

WAVE REPORTING PROCEDURES FOR TIDE OBSER-  
VERS IN THE TSUNAMI WARNING SYSTEM ...13.0007

TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSU-  
NAMI WARNING SYSTEM REVISED 1971 EDITION  
...13.0008

TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND  
CALIFORNIA ...13.0011

SATELLITE VOLCANO SURVEILLANCE - ALASKA,  
HAWAII AND WASHINGTON ...14.0002

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

IMPROVED OUTDOOR ALERTING AND WARNING  
...16.0039

EMERGENCY EQUIPMENT STANDARDS ...16.0042

FEDERAL PLAN FOR WEATHER RADARS ...16.0046

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
SATELLITE ...16.0047

DISASTER WARNING SATELLITE STUDY ...16.0048

## EVACUATION

THE HOMEPORST STORY - AN IMAGINARY CITY GETS  
READY FOR A HURRICANE ...8.0023

## *Emergency Routes & Plans*

EVACUATION OF COASTAL RESIDENTS DURING HUR-  
RICANES A PILOT STUDY FOR DADE COUNTY,  
FLORIDA ...8.0026

## PROTECTIVE MEASURES

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA  
...6.0033

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS  
- ALABAMA ...6.0034

- BLUE BRUSHLANDS OF THE SOUTHWEST ...6.0041
- SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN  
TECHNICAL REPORT ...6.0042
- FLOODS FROM SMALL DRAINAGE AREAS IN CALIFOR-  
NIA ...6.0043
- SOUTH COASTAL BASIN PRECIPITATION FREQUENCY -  
A REGIONAL ANALYSIS OF DEPTH-DURATION  
FREQUENCY OF SHORT-DURATION PRECIPITATION  
IN CALIFORNIA ...6.0044
- DRAINAGE AND FLOOD CONTROL BACKGROUND AND  
POLICY STUDY - SAN DIEGO ...6.0046
- INITIAL WATER, SEWERAGE AND FLOOD ...6.0047
- FLOOD FREQUENCY IN URBAN AREAS, COLORADO  
...6.0048
- A STUDY OF THE OPTIMAL MIX OF PRIVATE AND  
PUBLIC ACTION FOR LOCAL AND REGIONAL WATER  
CONSERVATION ...6.0051
- REGULATION OF GREAT LAKES WATER LEVELS RE-  
PORT TO THE INTERNATIONAL JOINT COMMISSION  
BY THE INTERNATIONAL GREAT LAKES LEVELS  
BOARD ...6.0052
- CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS  
RELATING TO CHANNEL DEVELOPMENT, EROSION,  
& BANK & LEVEE PROTECTION ...6.0053
- JACKSON HOLE FLOOD CONTROL PROJECT ...6.0054
- HURRICANE CREEK WATERSHED PROJECT,  
HUMPHREYS AND DICKSON COUNTIES, TENNESSEE  
...6.0055
- INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL DRAINAGE AREAS IN OHIO ...6.0059
- INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060
- PROGRAM FOR HYDROLOGIC INVESTIGATION OF  
SMALL DRAINAGE AREAS IN TEXAS ...6.0061
- FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
AREAS, IDAHO ...6.0063
- COLLECTION AND ANALYSIS OF STREAM FLOW AND  
RELATED HYDRAULIC DATA FOR DESIGN OF  
HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064
- FLOOD FREQUENCY IN SMALL DRAINAGE AREAS -  
MISSISSIPPI ...6.0065
- AN OPTIMUM WATER ALLOCATION MODEL BASED ON  
AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN -  
FLORIDA ...6.0066
- HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067
- RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068
- HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE  
COUNTY, FLORIDA ...6.0069
- STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070
- FLOOD HYDROLOGY AND URBAN WATER RESOURCES  
OF THE ISLAND OF OAHU, HAWAII ...6.0077
- INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF  
HAWAIIAN SMALL WATERSHEDS ...6.0078
- A METHODOLOGY STUDY TO DEVELOP EVALUATION  
CRITERIA FOR WILD AND SCENIC RIVERS - REPORT  
ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080
- DEVELOPMENT OF A FLOOD AND POLLUTION CON-  
TROL PLAN FOR THE CHICAGOLAND AREA - COM-  
PUTER SIMULATION PROGRAMS ...6.0083
- BACKGROUND SURVEY - SURFACE DRAINAGE PRO-  
GRAM, MADISON, ST. CLAIR, MONROE AND RAN-  
DOLPH COUNTIES, ILLINOIS ...6.0084
- LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085
- OAKLEY-SANGAMON REMOTE SENSING ENVIRONMEN-  
TAL RESEARCH PROGRAM - ILLINOIS ...6.0086
- DRAINAGE AND FLOOD CONTROL PLAN - MARION  
COUNTY, INDIANA SEPTEMBER 1970 ...6.0087
- STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090
- FLOOD INVESTIGATIONS - HIGHWAY COMMISSION -  
KANSAS ...6.0091
- STREAMFLOW PATTERNS WATERSHED CHARAC-  
TERISTICS THROUGH USE OF OPSET - A SELF  
CALIBRATING VERSION OF STANFORD WATERSHED  
MODEL (ABUREV) ...6.0092
- FLOOD-FREQUENCY STUDY - KENTUCKY ...6.0093
- RED RIVER EMERGENCY BANK PROTECTION, LOUI-  
SIANA, ARKANSAS, AND TEXAS ...6.0100
- THE IMPLICATIONS OF THE NET FISCAL BENEFITS  
CRITERION FOR COST SHARING IN FLOOD CONTROL  
PROJECTS ...6.0101
- FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND  
...6.0102
- FLOOD PROOFING DECISIONS UNDER UNCERTAINTY -  
AN APPLICATION TO THE CONNECTICUT RIVER  
BASIN ...6.0105
- FORECASTING RAINFALL AND SNOWMELT FLOODS ON  
UPPER MIDWESTERN WATERSHEDS ...6.0113
- SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115
- ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAU-  
GATUCK AND HOUSATONIC RIVERS, CONNECTICUT -  
HYDRAULIC MODEL INVESTIGATION ...6.0118
- FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER  
VALLEY ...6.0121
- OPTIMIZATION OF OPERATION OF A SYSTEM OF  
FLOOD CONTROL RESERVOIRS ...6.0123
- FLOOD WAVES FROM A CONTROLLED BREACHED  
DAM ...6.0124
- DEVELOPMENT OF AN OPERATIONS MODEL FOR MON-  
TANA'S WATER RESOURCES, MIDDLE CREEK RESER-  
VOIR OPERATION ...6.0126

SYSTEMS ANALYSIS IN THE DEVELOPMENT OF  
RESOURCES MANAGEMENT PLANS FOR NEW  
STATE - ADDENDUM ...6.0131

EVALUATION OF URBAN FLOOD PLAINS ...6.0132

RELATED ENVIRONMENTAL SERVICES ...6.0133

MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCES PLANNING AND MANAGEMENT IN  
CAROLINA ...6.0137

MODE AND FREQUENCY OF FLOOD  
DRAUGHTS FROM SMALL DRAINAGE BASINS, EF-  
FECT OF DRAINAGE BASIN CHARACTERISTICS -  
DAKOTA ...6.0138

MODE OF FLOOD-FREQUENCY REPORT -  
OKLAHOMA ...6.0139

LAKE, BIG HILL CREEK, KANSAS ...6.0141

LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

ANTECEDENT PRECIPITATION INDICES FOR  
EASTERN WATERSHEDS ...6.0144

SERIES FOR GAGED PENNSYLVANIA STREAMS  
INVESTIGATIONS - TENNESSEE ...6.0147

FLOOD ROUTING USING STOCHASTIC  
PROGRAMMING ...6.0150

ALTERNATE SOLUTIONS TO WATER RESOURCE  
MANAGEMENT--A CASE STUDY - TEXAS ...6.0151

EVALUATING THE TOTAL HYDROLOGIC-SOCIOLOGIC  
SYSTEM OF URBAN AREAS - PHASE III ...6.0153

ANALYSIS AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

PROGRAM FOR METROPOLITAN WATER MANAGE-  
MENT ...6.0243

EFFECT OF GRASSES FOR DUNE STABILIZATION  
ALONG THE GULF COAST WITH INITIAL EMPHASIS  
ON THE TEXAS COAST ...8.0049

EFFECT OF LAND SUBSIDENCE DUE TO GROUND-  
WATER WITHDRAWAL IN MISSISSIPPI ...10.0008

ANALYSIS OF QUANTITATIVE GROUND-WATER STU-  
DY IN THE HOUSTON DISTRICT ...10.0013

MODIFICATION OF GREAT LAKES WINTER  
ICE ...11.0003

ANALYSIS OF CLOUD SEEDING  
TECHNIQUES FOR MODIFYING OROGRAPHIC SNOW-  
FALL - THE CASCADE PROJECT ...11.0007

ANALYSIS OF TORNADO WIND LOADS ON  
BUILDINGS - TEXAS ...12.0019

EFFECTS OF WILDLIFE COVER AND EROSION  
CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESER-  
VOIR SYSTEMS ...15.0008

GEOLOGIC PLAN FOR CALIFORNIA - THE NA-  
TURAL MAGNITUDE, & COSTS OF GEOLOGIC

AVAILANCES ON THE NORTH CASCADES HIGHWAY  
(SR-20) - SUMMARY REPORT ...1.0006

CENTRAL FLORIDA SEEDING PROJECT ...2.0003

STUDIES OF URBAN EFFECTS ON RAINFALL AND  
SEVERE WEATHER ...2.0004

JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM  
FOR MITIGATION OF 1971 SOUTH FLORIDA  
DROUGHT ...2.0005

OKLAHOMA DROUGHT RELIEF OPERATIONAL PRO-  
GRAM (ODROP) ...2.0006

HYDROLOGIC SYSTEMS MODELING AND SIMULATION  
...2.0007

STUDIES OF GROUND MOTIONS IN LOCAL  
EARTHQUAKES ...3.0028

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUD-  
ING RESERVOIR INTERACTION ...3.0029

EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS  
INCLUDING FOUNDATION INTERACTION ...3.0030

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY  
DAMS ...3.0031

ENERGY ABSORPTION CHARACTERISTICS OF STRUC-  
TURAL SYSTEMS SUBJECTED TO EARTHQUAKE EX-  
CITATION ...3.0032

STOCHASTIC INELASTIC RESPONSE OF OFFSHORE  
TOWERS TO STRONG MOTION EARTHQUAKES  
...3.0033

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE  
RESPONSE ANALYSIS OF HORIZONTALLY LAYERED  
SITES ...3.0035

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDA-  
TION SYSTEMS ...3.0036

EARTHQUAKE STABILITY OF REINFORCED EARTH  
STRUCTURES ...3.0037

IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN  
...3.0038

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF  
MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION  
SYSTEMS ...3.0041

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE  
ENGINEERING, SAN FERNANDO DATA PROCESSING  
...3.0042

DYNAMICS OF BUILDING - SOIL INTERACTION ...3.0043

DYNAMIC ANALYSIS OF COUPLED SHEAR WALLS AND  
SANDWICH BEAMS ...3.0045

COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTI-  
CAL STRUCTURES BASED ON SEISMOGRAMS FROM  
THE SAN FERNANDO EARTHQUAKE (ABBREV)  
...3.0048

TETON DAM SEISMICITY - IDAHO ...3.0050

- 3.0056  
QUASISTATIC LATERAL DESIGN LOADS FOR  
EARTHQUAKE RESISTANT STRUCTURES 3.0058  
SEISMIC DESIGN OF LOW-RISE BUILDINGS 3.0059  
SHEAR MODULUS AND DAMPING IN SOILS - MEASURE-  
MENT AND PARAMETER EFFECTS 3.0060  
THE FORMULATION AND EXPERIMENTAL VERIFICA-  
TION OF MATHEMATICAL MODELS FOR PREDICTING  
DYNAMIC RESPONSE OF MULTISTORY BUILDINGS  
3.0061  
SENSITIVITY ANALYSES AND GRAPHICAL METHOD  
FOR PRELIMINARY SOLUTIONS 3.0062  
DAMAGE PROBABILITY MATRICES FOR PROTOTYPE  
BUILDINGS 3.0063  
SUMMARY OF METHODOLOGY AND PILOT APPLICA-  
TION 3.0064  
STRUCTURAL MODEL TESTS OF EARTHQUAKE EF-  
FECTS (ES 047) 3.0065  
EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
DAMS 3.0066  
STABILITY AND DYNAMIC RESPONSE OF COOLING  
TOWERS 3.0068  
REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL RE-  
PORT 3.0069  
INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOP-  
MENT IN EXPANSIVE CLAYS ON DAMAGE TO MILI-  
TARY FACILITIES (ABBREV) 4.0002  
REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
4.0003  
STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
4.0007  
HYDROLOGIC ENGINEERING METHODS FOR WATER  
RESOURCES DEVELOPMENT - VOLUME I - REQUIRE-  
MENTS AND GENERAL PROCEDURES 6.0037  
ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES 6.0040  
PEAK DISCHARGE AND FREQUENCY FOR SMALL  
WATERSHEDS IN COLORADO 6.0049  
FLOOD PROTECTION AT CULVERT OUTLETS 6.0050  
FLOOD FLOWS FROM SMALL DRAINAGE AREAS  
6.0058  
ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER  
MANAGEMENT 6.0072  
CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN  
FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
6.0074  
FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO  
6.0079  
FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN IL-  
LINOIS 6.0082  
INITIAL RESULTS FROM THE UPPER WABASH SIMULA-  
TION MODEL 6.0088  
RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS 6.0112  
BRIDGE SITE INVESTIGATIONS 6.0114  
DESIGN FOR FLOOD CONTROL AND WAVE PROTEC-  
TION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAU-  
LIC MODEL INVESTIGATION 6.0116  
DISCHARGE CHARACTERISTICS OF HURRICANE BARRI-  
ER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE  
ISLAND - HYDRAULIC MODEL INVESTIGATION  
6.0117  
FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH  
ADAMS MASSACHUSETTS 6.0120  
SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN  
RURAL MISSOURI 6.0122  
APPLICATION OF HYDROLOGIC AND HYDRAULIC  
RESEARCH TO CULVERT SELECTION IN MONTANA -  
VOLUME I - REPORT 6.0125  
EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
SALEM, NORTH CAROLINA 6.0134  
EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
NORTH CAROLINA 6.0135  
EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
NORTH CAROLINA 6.0136  
INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL WATERSHEDS IN OKLAHOMA 6.0140  
FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS 6.0145  
COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
6.0148  
HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE  
AREAS IN TEXAS 6.0149  
PORT ARTHUR HURRICANE FLOOD PROTECTION,  
PORT ARTHUR AND VICINITY, TEXAS 6.0152  
REVIEW EMERGENCY RELIEF FILES AND SURVEY THE  
TREND OF BRIDGE LOSSES DURING STORM CONDI-  
TIONS 6.0155  
RUNOFF SIMULATION 6.0156  
GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE  
PROTECTION ASSOCIATED WATER FEATURE, BAYOU  
LAFOURCHE - LOUISIANA (ABBREV) 8.0030  
NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE  
PROTECTION 8.0031  
LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY -  
HURRICANE PROTECTION PROJECT 8.0032  
HURRICANE PROTECTION PROJECT, STRATFORD, CON-  
NECTICUT 8.0034  
OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, MASSACHUSETTS 8.0035  
OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, NEW BEDFORD, MAS-  
SACHUSETTS 8.0036  
NEW LONDON HURRICANE PROTECTION PROJECT,  
NEW LONDON, CONNECTICUT 8.0037

BAY HURRICANE SURGE STUDY - BAR-  
 HURRICANE SURGE HEIGHTS - HYDRAU-  
 EL INVESTIGATION ...8.0040  
 SURGE CONDITIONS AFTER PROPOSED EX-  
 OF MONTEREY HARBOR, MONTEREY,  
 NIA - HYDRAULIC MODEL INVESTIGATION  
 D SURGE ACTION, MONTEREY HARBOR,  
 EY, CALIFORNIA - MODEL INVESTIGATION  
 E CHARACTERISTICS OF HURRICANE BAR-  
 WAREHAM-MARION, MASSACHUSETTS -  
 LIC MODEL INVESTIGATION ...8.0043  
 N BAY HURRICANE SURGE - REPORT 1 - EF-  
 F PROPOSED BARRIERS ON HURRICANE  
 HEIGHTS (ABBREV) ...8.0045  
 N BAY HURRICANE SURGE - REPORT (2) EF-  
 F PROPOSED BARRIERS ON TIDES, CUR-  
 ALINITIES, AND DYE DISPERSION (ABBREV)  
 N OF NARRAGANSETT BAY FROM HUR-  
 RAGES ...8.0047  
 N LAKE PONTCHARTRAIN, LA., OF HUR-  
 RAGE CONTROL STRUCTURES AND MISSIS-  
 SIPPI GULF OUTLET CHANNEL ...8.0048  
 GEOLOGIC FRAMEWORK - SAN ANDREAS  
 CALIFORNIA ...9.0001  
 SLOPE STABILITY STUDIES - CALIFORNIA  
 NSYLVANIA ...9.0002  
 ION OF DEBRIS FLOWS 9973-EN ...9.0003  
 RK REINFORCEMENT TECHNIQUES - LOS AN-  
 REA ...9.0005  
 E ROCK NOISE (SARN) AS A MEASURE OF  
 ABILITY, CALIFORNIA ...9.0006  
 OPE PROTECTION FOR EARTH DAMS - A  
 OF PRACTICES AND PROCEDURES ...9.0008  
 OF SLOPE FAILURE PLANES ...9.0009  
 LENGTH OF FINE-GRAINED SOILS - WEST  
 EW YORK ...9.0010  
 NG GEOLOGY - ILLINOIS ...9.0011  
 RAIN-TIME BEHAVIOR OF SOIL AND ROCK  
 TRIAXIAL CONDITIONS ...9.0012  
 DRAINAGE FROM IN-PLACE FILLS TO  
 OR HALT FILL ...9.0013  
 TION OF LANDSLIDES ON HIGHWAYS  
 ES - KENTUCKY ...9.0015  
 ABILITY OF CUTS IN ONTONAGON CLAY  
 ILITY IN RIDGE ROUTE LANDSLIDES, GOR-  
 LIFORNIA ...9.0017  
 TION OF RED RIVER VALLEY GEOLOGY -  
 ON STRUCTURE DESIGN AND PER-  
 CE ...9.0018

MONTANA ...9.0021  
 LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
 NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
 POTENTIAL IN THE PIERRE SHALE ...9.0022  
 A SURVEY OF EARTH SLOPE FAILURES AND REMEDI-  
 AL MEASURES IN TEXAS ...9.0023  
 COAL MINE DEFORMATION STUDIES, SOMERSET,  
 COLORADO ...10.0004  
 DEVELOP METHODS FOR PREDICTING THE COM-  
 PONENTS OF GROUND MOVEMENT ABOVE MINE  
 WORKINGS ...10.0005  
 MICROSEISMIC DETERMINATION OF COAL MINE  
 ENTRY STABILITY ...10.0006  
 ROCK MECHANICS STUDY OF SHORTWALL MINING -  
 KENTUCKY ...10.0007  
 DETECTION OF SUBSURFACE OPENINGS - INDIANA,  
 MISSOURI ...10.0009  
 STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
 AS A MECHANISM FOR FAILURE OF MILITARY IN-  
 STALLATIONS ...10.0010  
 LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
 ...10.0011  
 LAND-SURFACE SUBSIDENCE, TEXAS CITY AND  
 SEABROOK AREAS, TEXAS ...10.0012  
 DETERMINATION OF SNOW FENCE DESIGN CRITERIA,  
 AND DEVELOPMENT OF A HANDBOOK FOR SNOW  
 CONTROL ...11.0008  
 WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN  
 TALL BUILDINGS ...12.0018  
 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COM-  
 BINATIONS OF ASTRONOMICAL TIDES AND TSU-  
 NAMIS RECORDED AT CRESCENT CITY, CALIFORNIA  
 ...13.0001  
 GENERAL REVIEW OF THE SEISMIC HAZARD TO  
 SELECTED U.S. NAVY INSTALLATIONS ...13.0002  
 TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS  
 AND TESTIMONY - VOLUME V ...13.0006  
 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER  
 HILO HARBOR, HAWAII HYDRAULIC MODEL IN-  
 VESTIGATION ...13.0009  
 STEADY-FLOW STABILITY TESTS OF NAVIGATION  
 OPENING STRUCTURES, HILO HARBOR, TSUNAMI  
 BARRIER, HILO, HAWAII - HYDRAULIC MODEL IN-  
 VESTIGATION ...13.0010  
 COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
 ...15.0001  
 CONCRETE BLOCK REVETMENT NEAR BENEDICT,  
 MARYLAND ...15.0004  
 KENNEDY SPACE CENTER OCEAN BEACH EROSION -  
 FLORIDA ...15.0005  
 BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORA-  
 TION, BEACH EROSION CONTROL AND HURRICANE  
 PROTECTION PROJECT, DADE COUNTY, FLORIDA  
 ...15.0006

PROTECTION PROJECT, DELAWARE ...15.0010  
VIRGINIA BEACH, VIRGINIA - BEACH EROSION CON-  
TROL AND HURRICANE PROTECTION ...15.0011  
NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035  
MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR  
ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

*Public Education*

FIRE PREVENTION - CALIFORNIA ...5.0025

## Disaster Warning

*See Disaster Mitigation*

## Economic Assistance

*See Assistance - Public  
Economic Recovery*

## Economic Recovery

*See Assistance - Public*

## Emergency Communications

*See Disaster Mitigation  
Disaster Warning*

## Emergency Protective Measures

*See Assistance - Public  
Restoration & Repair*

## Emergency Routes & Plans

*See Disaster Mitigation  
Evacuation*

## Engineering & Construction

*See Disaster Mitigation  
Protective Measures*

## Essential Services

*See Assistance - Public*

## Fire Suppression

*See Assistance - Public  
Restoration & Repair*

## Flood Plain Management

*See Hazard Reduction  
Vulnerability Analysis*

## Forecasting and Prediction

*See Hazard Reduction  
Vulnerability Analysis*

## Geophysical Modification

*See Hazard Reduction  
Vulnerability Analysis*

## Hazard Delineation

*See Hazard Reduction  
Vulnerability Analysis*

## Hazard Reduction

### CONSTRUCTION PRACTICES

STIFFNESS DEGRADATION OF REINFORCED CONCRETE  
MEMBERS SUBJECTED TO CYCLIC FLEXURAL MO-  
MENTS ...3.0073

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC  
BEHAVIOR OF CRITICAL REGIONS OF REINFORCED  
CONCRETE COMPONENTS AS INFLUENCED BY MO-  
MENT AND SHEAR ...3.0076

ADAP - A COMPUTER PROGRAM FOR STATIC AND  
DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

NONLINEAR ANALYSIS OF REINFORCED CONCRETE  
FRAMES AND PANELS ...3.0078

GENERAL PURPOSE COMPUTER PROGRAM FOR IN-  
ELASTIC DYNAMIC RESPONSE OF PLANE STRUC-  
TURES ...3.0079

CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFOR-  
MATION OF ENGINEERING MATERIALS ...3.0081

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN  
SUBASSEMBLAGES ...3.0082

OF THREE DIMENSIONAL MEMBERS WITH HIGH SHEAR

NG OF FULL-SIZE CONNECTIONS

VIOR OF A HIGH-RISE DIAGONALLY  
BUILDING ...3.0091

HE SLIDES IN THE SAN FERNANDO  
THE EARTHQUAKE OF FEBRUARY 9,

INVESTIGATIONS OF THE SEISMIC  
LONG MULTIPLE SPAN HIGHWAY  
98

EARTHQUAKE ANALYSIS OF THREE-  
FRAME AND SHEAR WALL BUILDINGS

NG AND EARTHQUAKE RESPONSE OF  
GS ...3.0141

TION OF A 22-STORY STEEL FRAME  
144

THE EARTHQUAKE RESPONSE OF A  
TEEL FRAME BUILDING DURING THE  
O EARTHQUAKE ...3.0148

ENERGY ABSORBER ...3.0152

EXISTING MASONRY WALLS ...3.0189

EST ON A TWO-STORY HOUSE SUB-  
TERAL LOAD ...3.0195

OR RETROFITTING EXISTING BRIDGE  
TO REDUCE THE SUSCEPTIBILITY TO  
DAMAGE ...3.0204

RELATIONSHIPS OF REINFORCING  
TED TO LARGE STRAIN REVERSALS

VO-DIMENSIONAL EARTHQUAKE MO-  
REINFORCED CONCRETE COLUMN

ENERGY-DISSIPATION OF REINFORCED  
AMES SUBJECTED TO STRONG BASE  
210

EFFECTS ON REINFORCED CONCRETE  
0211

STRUCTURAL DAMAGE CAUSED BY  
TOWARD THE DEVELOPMENT OF  
RESISTANT DESIGN (ABBREV) ...3.0212

CH DECAY IN REINFORCED CONCRETE  
SUBJECTED TO LARGE DEFLECTION  
0214

ANALYSIS OF ELASTO-PLASTIC STRUC-

OF FATIGUE FAILURE UNDER  
LOADS ...3.0251

CTURAL SYSTEMS ...3.0253

AVOR OF BILINEAR STRUCTURAL  
55

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN  
AND WALL CONNECTIONS ...3.0282

### *Model Building Codes*

ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE  
...3.0154

ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159

BUILDING PRACTICES FOR DISASTER MITIGATION  
...3.0188

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST  
HOUSING AND COMMUNITY BUILDINGS TO BETTER  
WITHSTAND EARTHQUAKES AND WINDSTORMS  
...3.0191

BUILDING PRACTICES FOR DISASTER MITIGATION  
...3.0192

EARTHQUAKE DESIGN FOR MASONRY STRUCTURES  
...3.0193

EARTHQUAKE RESISTANT DESIGN REQUIREMENTS  
FOR VA HOSPITAL FACILITIES ...3.0201

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

PROBABILISTIC METHODS IN CIVIL ENGINEERING  
...3.0208

METHODOLOGY AND PILOT APPLICATION ...3.0230

SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254

EARTHQUAKE RISK EVALUATION - CRITTENDEN  
COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI,  
AND SHELBY COUNTY, TENNESSEE ...3.0269

BUILDING STANDARDS AND THE EARTHQUAKE  
HAZARD FOR THE PUGET SOUND BASIN ...3.0281

FLOOD-PROOFING REGULATIONS ...6.0358

HURRICANE CAMILLE - AUGUST 1969 ...8.0074

HURRICANE EFFECTS ON PORT FACILITIES ...8.0076

WIND AND SURGE DAMAGE DUE TO HURRICANE  
CAMILLE ...8.0078

ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN  
STUDY FOR THE CITY OF GLENDORA, CALIFORNIA  
...9.0026

FREQUENCY AND INTENSITY OF FREEZING  
RAIN/DRIZZLE IN OHIO ...11.0009

SEISMIC HAZARDS AND LAND-USE PLANNING ...16.0074

### *Standards*

EARTHQUAKE SAFETY OF SCHOOL BUILDINGS ...3.0075  
OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT  
SHEAR BUILDINGS ...3.0090

RECOMMENDATIONS DEVELOPED FROM REPORTS OF  
THE EARTHQUAKE COMMISSION AND EARTHQUAKE  
TASK FORCES - SAN FERNANDO EARTHQUAKE  
(ABBREV) ...3.0101

APPLICATION OF DECISION THEORY IN STRUCTURAL  
DESIGN FOR RESISTANCE TO LOADINGS GENERATED  
BY EARTHQUAKE PHENOMENA ...3.0136

3.0165  
EARTH AND ROCKFILL DAM DESIGN PRACTICES  
3.0171  
SEISMIC DESIGN FOR BUILDINGS ...3.0187  
INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190  
DESIGN CRITERIA FOR MASONRY ...3.0194  
PROTECTION OF TRANSPORTATION FACILITIES AGAINST EARTHQUAKES ...3.0199  
EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203  
SEISMIC RESEARCH ...3.0225  
INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES ...3.0227  
SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229  
A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING ...3.0252  
SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265  
BUILDING PRACTICES FOR DISASTER MITIGATION ...16.0073

#### *Subdivision Regulations*

LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS ...3.0257

#### *LAND USE AND DEVELOPMENT*

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017  
EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA ...3.0094  
SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES ...3.0096  
PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY. CALIFORNIA ...3.0121

...6.0170  
COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS ...6.0173  
PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV) ...6.0175  
NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA ...6.0178  
RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT ...6.0192  
NUTWOOD WATERSHED, ILLINOIS ...6.0199  
VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205  
OHIO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U. S. WATER RESOURCES COUNCIL (ABBREV) ...6.0228  
SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238  
THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242  
HAWAII ENVIRONMENTAL SIMULATION MODEL ...6.0252  
NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258  
A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260  
THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270  
ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272  
MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI ...6.0320  
HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323  
NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE ...6.0333  
URBAN RUNOFF ...6.0339  
APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971 ...6.0350  
APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351  
MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN ...6.0363  
BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368  
EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374  
PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT ...6.0385



RO ...14.0011  
 R PLAIN, PART E - NORTH CENTRAL -  
 ...0012  
 EROSION OF SOILS ...15.0012  
 TERIAL PLANNING AND GEOLOGY -  
 GS OF THE SYMPOSIUM ON ENGINEER-  
 OGY IN THE URBAN ENVIRONMENT  
 NVIRONMENTAL MAPS FOR LAND-USE  
 CALIFORNIA ...16.0055  
 ERING RESEARCH - CALIFORNIA ...16.0056  
 DESIGN-1971 - SAN FRANCISCO BAY REGION  
 ENT AND RESOURCES PLANNING STUDY

### *Land Use Practices*

STIC EARTHQUAKE RESPONSE OF SOIL-  
 SYSTEMS ...3.0085  
 D PROCEDURE FOR EVALUATING SOIL  
 ION POTENTIAL ...3.0097  
 ANCE STUDY OF RECOVERABLE GROUND  
 ...0100  
 NTAL GEOLOGY OF THE SAN FRANCISCO  
 N - CALIFORNIA ...3.0109  
 I OF PROBABILITY, STATISTICS AND DECI-  
 SION IN SOIL ENGINEERING ...3.0137  
 ES AND ACTIVE FAULTS ...3.0173  
 AND COUPLED SEISMIC EFFECTS ...3.0228  
 NT OF IMPROVED TECHNIQUES FOR  
 DESCRIBED FIRE IN SOUTHERN FORESTS  
 OF SMALL WATERSHEDS ...6.0190  
 NORTH SECTOR UPPER WALNUT  
 D BUTLER AND CHASE COUNTIES ...6.0195  
 K WATERSHED PROJECT, SOUTH DAKOTA  
 CREEK WATERSHED PROJECT, SOUTH  
 ...6.0197  
 NORTH SECTOR UPPER WALNUT  
 D BUTLER AND CHASE COUNTIES ...6.0198  
 CREEK WATERSHED STRUCTURAL PRO-  
 CRE, KENTUCKY ...6.0200  
 NORTH AND CULP DRAWS WATERSHED,  
 COUNTY, TEXAS, AND OTERO COUNTY,  
 CO ...6.0201  
 WATERSHED, KANSAS ...6.0202  
 OAD-FILL DAM, KANSAS ...6.0203  
 HER WATERSHED, NORTH DAKOTA  
 R CREEK HYDROLOGIC UNIT PROJECT  
 CHEROKEE HILLS RC AND D PROJECT,  
 A ...6.0206  
 FOR PLANNING WATER AND LAND  
 S ...6.0223

REDESIGNING FLOOD MANAGEMENT - PROJECT  
 AGNES - PHASE I ...6.0334  
 SOIL AND WATER CONSERVATION NEEDS INVENTORY,  
 COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS  
 ...6.0381  
 GEOLOGY OF THE POINT BONITA QUADRANGLE,  
 CALIFORNIA ...9.0032  
 REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
 ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
 AND LAND USE PLANNING ...9.0035  
 LIME SOIL STABILIZATION STUDY ...9.0037  
 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO  
 ...9.0040  
 DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044  
 REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
 GEOLOGY ...9.0050  
 EFFECTS OF DEFORESTATION ON THE STABILITY OF  
 NATURAL SLOPES - OREGON, WASHINGTON ...9.0051  
 ARIZONA EARTH FISSURE INVESTIGATION ...10.0014  
 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
 STUDY THE EXTENT, MAGNITUDE R ...10.0018  
 LAND SUBSIDENCE STUDIES IN THE SAN JOAQUIN  
 VALLEY - CALIFORNIA ...10.0019  
 DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME  
 DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE  
 ...10.0022  
 ESTABLISH TECHNIQUES FOR MONITORING SURFACE  
 SUBSIDENCE OVER MINED AREAS ...10.0023  
 MEASUREMENT AND EVALUATION OF SUBSIDENCE  
 OVER A COAL MINE WITH VARYING OVERBURDEN  
 THICKNESS ...10.0024  
 STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC  
 COASTAL PLAIN PROVINCE, NORTHERN ALASKA  
 VOLUME I ...10.0025  
 EARLY DETECTION AND CORRECTION OF SINKHOLE  
 PROBLEMS - ALABAMA ...10.0027  
 SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS  
 ...10.0028  
 REMOTE SENSING, ALFAFIA AND PEACE RIVER  
 BASINS, FLORIDA ...10.0029  
 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
 MODELS - OHIO ...10.0031  
 CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF  
 COAST AREA ...10.0032  
 SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

### *Ordinances*

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194  
 ZONING REGULATIONS OF THE CITY OF SARASOTA,  
 FLORIDA ...6.0232  
 FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN OR-  
 DINANCE ...6.0235  
 FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN OR-  
 DINANCE, MARCH, 1972 ...6.0236

FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA ...6.0277

ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY ...6.0283

ZONING ORDINANCE - PAINTSVILLE, KENTUCKY ...6.0284

FLOOD PLAIN STUDIES--MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332

DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973 ...6.0354

ZONING ORDINANCE, HUNTINGDON, TENNESSEE ...6.0369

FLOOD INUNDATION STUDY, WISCONSIN ...6.0409

RETURNING UNDERGROUND COAL MINE WASTES TO MINED-OUT VOIDS ...10.0026

#### *Subdivision Regulations*

SANTA CRUZ COUNTY COOP ...3.0106

GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179

REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226

SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS ...6.0231

ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI ...6.0309

URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401

WATER RESOURCES POLICY IN WISCONSIN - VOLUME IV - FLOOD PLAIN MANAGEMENT ...6.0410

#### *Zoning*

RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION ...3.0218

LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162

URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237

FLOOD PLAIN MAPPING IN HAWAII ...6.0250

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0275

LATED LAND AREAS - MAINE ...6.0288

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291

RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 ...6.0295

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

NEW TECHNIQUES FOR DELINEATION OF FLOOD PLAIN HAZARD ZONES - SOIL SURVEYS ...6.0411

THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS ...6.0413

#### *LEGISLATION*

THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN ...3.0149

MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY ...3.0150

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034

STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA ...6.0157

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA ...6.0399

#### *MANAGEMENT Disaster Operations*

IMPACT OF THE LUBBOCK STORM ON REGIONAL SYSTEMS - TEXAS ...12.0040

PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW ...16.0050

THE CHARLOTTE CONSORTIUM TASK 1 REPORT - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM ...16.0096

THE POLICE DEPARTMENT IN NATURAL DISASTER OPERATIONS ...16.0097

TABLE DISASTER IN A METROPOLIS -  
RESPONSE TO THE LOS ANGELES  
KE OF FEBRUARY, 1971 ...3.0074

ISTICS OF PEOPLE WHO START FIRES  
RELIMINARY FINDINGS - CALIFORNIA

DEFINED ENVIRONMENTAL VALUES IN  
TER RESOURCES PLANNING ...6.0191

ECOLOGICAL IMPACT OF STRUCTURAL  
CONTROL ON THE IOWA RIVER, IOWA

IAL IMPACT OF A FLOOD-CONTROL RESER-  
60

HE ELEMENTS OF THE SOCIOLOGICAL  
ELATED TO DRAINAGE PROBLEMS OF  
EAS ...6.0390

ITIVE ANALYSIS OF PUBLIC SUPPORT OF  
FANCE TO WEATHER MODIFICATION PRO-  
0061

ES OF DISASTER BEHAVIOR - AN INVEN-  
0064

Y STUDIES OF THE EFFECTS OF PHYSICAL  
N SHELTER MANAGEMENT BEHAVIOR -  
TUDY PLAN ...16.0078

IGATION OF SHELTER MANAGEMENT AND  
N NATURAL DISASTER ...16.0079

S OF OPERATING SYSTEM EFFECTIVENESS  
N THE BEHAVIOR OF LOCAL COORDINA-  
085

RMANCE IN THE OPERATING SYSTEM -  
NSE OPERATIONS IN DISASTER ...16.0086

ITIVE RESEARCH ON NATURAL HAZARDS

VE ON DISASTER PLANNING ...16.0098

Q SYSTEM IN DISASTER SITUATIONS - A  
ANALYSIS ...16.0099

ONAL RESPONSES TO MAJOR COMMUNI-  
...16.0100

ELIEF - DOMESTIC ACTION IN THE SPOT-  
0101

VULNERABILITY ANALYSIS

*Coastal Zone Management*

ND GROUND WATER OF CAPE SABLE,  
DURING EXTREME DROUGHT ...2.0014

OF GEOLOGIC STRUCTURE ON THE OC-  
OF FRESH GROUND WATER IN POST-  
E DEPOSITS OF THE GULF COASTAL  
243

PLANNING PROJECT - CALIFORNIA ...6.0182

ND RIVER BASINS COMMISSION, ANNUAL  
SCAL YEAR 1971 ...6.0227

ROLOGY STUDY - HOUSTON, TEXAS

JAMAICA BAY HURRICANE BARRIER STUDY NEW  
YORK ...8.0119

COASTAL ENGINEERING STUDIES RELATED TO  
FLORIDA'S SHORELINE AND BEACH EROSION  
PROBLEMS ...15.0016

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

NATIONAL SHORELINE STUDY - GREAT LAKES REGION  
INVENTORY REPORT ...15.0019

NATIONAL SHORELINE STUDY - INVENTORY REPORT -  
LOWER MISSISSIPPI REGION ...15.0021

COASTAL ZONE AND SHORELANDS MANAGEMENT -  
GREAT LAKES ...15.0026

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...15.0029

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF  
LAKE ERIE ...15.0032

INVESTIGATION OF SHORELINE CHANGES AT SAR-  
GENT BEACH, TEXAS ...15.0036

ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS  
COASTAL ZONE, GALVESTON-HOUSTON AREA  
...16.0104

#### *Disaster Insurance*

EARTHQUAKES AND INSURANCE - ERA CONFERENCE  
2-3 APRIL 1973 ...3.0140

REPORT ON EARTHQUAKE INSURANCE TO CONGRESS  
OF UNITED STATES - PURSUANT TO SECTION FIVE OF  
SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965  
...3.0196

REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, AR-  
KANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA  
...3.0270

FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY  
...6.0286

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS  
...6.0324

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
& FLOOD INUNDATION - NEW JERSEY ...6.0326

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

COST-EFFECTIVENESS ANALYSES OF REGIONAL  
FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COM-  
MUNITIES - TYPE 16 FLOOD INSURANCE STUDY  
...13.0028

#### *Flood Plain Management*

FLOOD MANAGEMENT STUDY ...6.0159

- PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160
- FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161
- STOCHASTIC HYDROLOGY ...6.0167
- SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172
- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174
- FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176
- FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180
- DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SUMMARY REPORT ...6.0181
- FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187
- SMALL STREAM FLOOD CHARACTERISTICS ...6.0193
- FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215
- INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0217
- INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0219
- DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220
- A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES ...6.0224
- THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239
- THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240
- ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244
- WATER RESOURCES OF MIDDLE GEORGIA ...6.0245
- HYDROLOGIC RELATIONS IN HAWAII ...6.0247
- SPECIAL FLOOD DATA COLLECTION, HAWAII ...6.0249
- SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251
- FLOOD FREQUENCY STUDY ILLINOIS ...6.0256
- COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257
- STREAMFLOW VARIABILITY - ILLINOIS ...6.0263
- WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION ...6.0271
- FLOOD PROFILES OF IOWA STREAMS ...6.0274
- EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282
- LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297
- THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT ...6.0302
- SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306
- URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (ABBREV) ...6.0307
- URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV) ...6.0308
- MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY ...6.0312
- MISSISSIPPI BASIN MODEL ...6.0313
- DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316
- STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318
- FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY ...6.0325
- APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN ...6.0337
- EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343
- MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344
- APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN ...6.0346
- DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM ...6.0347
- FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349
- FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP AND TILLAMOOK COUNTIES, OREGON - 1972-1973 ...6.0352
- FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO ...6.0362
- INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366
- DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367
- FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370
- INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE

HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382  
 HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0394  
 STUDIES OF FLOOD-PLAIN MAPPING FOR LAND-  
 MANAGEMENT OF FLOOD PLAINS ...6.0394  
 CHOICE AND THE DISTRIBUTION OF BENEFITS  
 COSTS OF FLOOD PLAIN REGULATION - VIR-  
 GINIA ...6.0397  
 DAMAGE ABATEMENT: FEDERAL ASSISTANCE  
 LOCAL GOVERNMENT ...6.0398  
 HYDROLOGY OF STREAMS IN FAIRFAX COUN-  
 TY, VIRGINIA ...6.0400

PROFILES AND INUNDATED AREAS ALONG  
 KOMISH RIVER, WASHINGTON ...6.0404  
 FLOOD-FREQUENCY STUDY (PHASE II)  
 SENSING FOR RESOURCE MANAGEMENT AND  
 PLAIN DELINEATION ...6.0412  
 INVESTIGATIONS IN WYOMING ...6.0414  
 OF FLOOD HYDROGRAPHS FOR SMALL  
 CREEK BASINS IN WYOMING ...6.0415  
 EVALUATION OF EMPIRICAL METHOD OF DETERMIN-  
 ING CHANNEL STABILITY (POTAMOCYCLIC IN-  
 STABILITY - SOILS PHASE) ...10.0030

#### *Forecasting and Prediction*

EVALUATION OF METHODOLOGY FOR EVALUATION  
 PREDICTION OF AVALANCHE HAZARD IN THE  
 ROCKY MOUNTAINS OF COLORADO ...1.0008  
 YIELD IMPROVEMENT AND AVALANCHE  
 PREDICTION IN ALPINE AREAS OF THE  
 ROCKY MOUNTAINS ...1.0011  
 CHANNEL STABILITY INDICES RELATIVE TO THE  
 AVALANCHE ...1.0013  
 CHANNEL CONTROL IMPLEMENTATION STUDY  
 IN KANSAS ...2.0013  
 AND FREQUENCY OF DROUGHT IN MISSIS-  
 SIPPI ...2.0015  
 AND WET SPELLS IN NORTH DAKOTA  
 PROBABILITIES IN TENNESSEE ...2.0023  
 CENTRAL STRAIN - CALIFORNIA AND NEVADA  
 RING SEISMOLOGY - CALIFORNIA ...3.0118  
 STUDIES - CALIFORNIA, NEVADA, MONTANA  
 STRAIN - CALIFORNIA, NEVADA, MONTANA,  
 AND NEW MEXICO ...3.0127  
 STRUCTURE AND FAULT TECTONICS AS RE-  
 LATION TO EARTHQUAKE PREDICTION - CALIFORNIA

PREDICTION ...3.0260  
 SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF  
 SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES  
 ...3.0261  
 SEISMIC HAZARD REGIONALIZATION AND PROBABILI-  
 TY OF FUTURE EARTHQUAKES IN THE UNITED  
 STATES ...3.0268  
 REGIONAL SEISMICITY AND TECTONICS OF THE  
 SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH  
 EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276  
 PROBABILITY FIRE WEATHER FORECASTS SHOW  
 PROMISE IN 3-YEAR TRIAL ...5.0039  
 DEVELOPMENT OF AN ALASKAN CONCEPTUAL  
 WATERSHED MODEL ...6.0163  
 APPLICATIONS OF AERIAL MEASUREMENTS  
 TECHNIQUES ...6.0164  
 DEVELOPMENT OF AERIAL MEASUREMENT  
 TECHNIQUES ...6.0165  
 PROCEDURES FOR ESTIMATING FLOOD FLOWS FROM  
 SMALL RURAL WATERSHEDS ...6.0177  
 FLOOD HYDROLOGY INVESTIGATIONS ...6.0183  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL  
 WATERSHEDS IN COLORADO ...6.0186  
 HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS  
 - INDIANA ...6.0208  
 PEAK FLOW FROM SMALL DRAINAGE AREAS - CON-  
 NECTICUT ...6.0210  
 FLOOD FREQUENCY OF ALABAMA STREAMS -  
 ALABAMA ...6.0213  
 FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS  
 - ALABAMA ...6.0214  
 WATER RESOURCES INVESTIGATIONS ...6.0216  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM  
 SMALL DRAINAGE AREAS IN SOUTH CAROLINA  
 ...6.0222  
 SPACE-TIME VARIATIONS IN HIGH INTENSITY RAIN-  
 FALL ON THE WINDWARD COAST OF THE ISLAND OF  
 HAWAII (PHASE III) ...6.0246  
 MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL  
 DRAINAGE BASINS IN IDAHO ...6.0254  
 RESEARCH INITIATION - A MULTIDIMENSIONAL  
 STOCHASTIC MODEL FOR FLOOD PREDICTION  
 ...6.0259  
 PROBABLE MAXIMUM PRECIPITATION AND SNOW-  
 MELT CRITERIA FOR RED RIVER OF THE NORTH  
 ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT,  
 NORTH DAKOTA ...6.0290  
 PREDICTION OF THE MAGNITUDES AND FREQUENCIES  
 OF FLOODS IN MICHIGAN ...6.0299  
 FLOOD FORECASTING IN THE UPPER MIDWEST - DATA  
 ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301  
 DEMONSTRATION OF THE ELECTRIC ANALOG MODEL  
 OF THE KANSAS RIVER AT THE UNIVERSITY OF  
 CALIFORNIA IN BERKELEY ...6.0314

- CLOSELY 6.0355  
 COMPARISON OF RECENTLY PUBLISHED FORMULAE  
 FOR FLOOD FREQUENCY IN PENNSYLVANIA 6.0356  
 FLOOD FREQUENCY OF SMALL AREAS - SOUTH  
 CAROLINA 6.0365  
 TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES  
 FOR WATER RESOURCE PLANNING 6.0378  
 RELATION OF CLIMATIC AND WATERSHED CHARAC-  
 TERISTICS TO STORM RUNOFF IN THE EDWARDS  
 PLATEAU - TEXAS 6.0388  
 SURVEY OF LAKE FLOODING FROM ERTS-1 - LAKE  
 CHAMPLAIN 6.0393  
 FLOOD PROFILES AND INUNDATED AREAS ALONG  
 THE LOWER NISQUALLY RIVER, WASHINGTON  
 6.0403  
 FLOOD HAZARD INFORMATION - BUFFALO CREEK,  
 LOGAN COUNTY, WEST VIRGINIA POST-DISASTER  
 CONDITIONS 6.0405  
 THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN  
 NEVADA 7.0016  
 STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
 NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
 WISCONSIN 7.0018  
 FURTHER VERIFICATIONS OF AND EXPERIMENTS TO  
 IMPROVE THE MODIFIED HATRACK SCHEME FOR  
 FORECASTING THE MOTION OF TROPICAL  
 CYCLONES 8.0052  
 TROPICAL CYCLONE MOVEMENT FORECASTS BASED  
 ON OBSERVATIONS FROM SATELLITES 8.0053  
 TROPICAL METEOROLOGIC PROBLEMS 8.0058  
 HURRICANE RESEARCH MODELING 8.0061  
 A TECHNIQUE FOR THE ANALYSIS AND FORECASTING  
 OF TROPICAL CYCLONE INTENSITIES FROM SATEL-  
 LITE PICTURES 8.0075  
 COMPUTER METHODS APPLIED TO ATLANTIC AREA  
 TROPICAL STORM AND HURRICANE CLIMATOLOGY  
 8.0086  
 PREDICTION OF HURRICANE DEVELOPMENT AND  
 MOVEMENT WITH A BAROCLINIC MODEL 8.0089  
 GRAPHICAL DISPLAY OF HURRICANE FORECASTS  
 8.0090  
 STATISTICAL-DYNAMICAL PREDICTION OF HUR-  
 RICANE TRACKS 8.0091  
 ERROR ANALYSIS OF HURRICANE FORECASTS 8.0092  
 BAROTROPIC PREDICTION OF HURRICANE TRACKS  
 8.0093  
 GIANT WAVES HIT HAWAII 8.0097  
 EXTENDING THE COMPUTERIZED TYPHOON/TROPICAL  
 STORM PREDICTION PROGRAM (TYPHOON 72)  
 TOWARD SEVEN DAYS 8.0105  
 BENEFITS OF ENVIRONMENTAL PREDICTION IN THE  
 EASTERN GULF OF MEXICO 8.0106  
 VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF  
 THE GOES SATELLITE 8.0108  
 TROPICAL STORM SURGE FORECASTING 8.0109  
 MARINE CONDITIONS AND AUTOMATED FORECASTS  
 FOR THE ATLANTIC COASTAL STORM OF FEBRUARY  
 18-20, 1972 8.0115  
 FORECASTING EXTRATROPICAL STORM SURGES FOR  
 THE NORTHEAST COAST OF THE UNITED STATES  
 8.0116  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILI-  
 TIES (FOR SELECTED STATIONS AND THE MONTH OF  
 SEPTEMBER) 8.0122  
 SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE  
 LISTING OF TROPICAL CYCLONES THAT HAVE AF-  
 FECTED SOUTH CAROLINA 8.0127  
 A DECISION PROCEDURE FOR APPLICATION IN PRE-  
 DICTING THE LANDFALL OF HURRICANES 8.0130  
 THE DECISION PROCESS IN HURRICANE FORECASTING  
 8.0131  
 FORECASTING STORM-INDUCED BEACH CHANGES  
 ALONG VIRGINIA'S OCEAN COAST 8.0134  
 STORM-SURGE FORECASTING 8.0136  
 DEVELOPING REMOTE SENSING TECHNIQUES FOR AID-  
 ING PREDICTION OF LANDSLIDES 9.0058  
 SEVERE STORM MORPHOLOGY - OKLAHOMA 12.0023  
 HURRICANE SPAWNED TORNADOES 12.0028  
 FORECASTING GUSTY SURFACE WINDS IN THE CON-  
 TINENTAL UNITED STATES 12.0029  
 ESTIMATE OF MAXIMUM WIND SPEEDS OF TOR-  
 NADOES IN THREE NORTHWESTERN STATES -  
 IDAHO, OREGON, WASHINGTON 12.0030  
 STUDY OF URBAN EFFECTS ON PRECIPITATION AND  
 SEVERE WEATHER AT ST. LOUIS - ILLINOIS 12.0032  
 DUST DEVIL METEOROLOGY 12.0036  
 COMPUTER SIMULATION OF SEVERE STORM OBSER-  
 VATIONS WITH DOPPLER RADARS 12.0041  
 GEODIMETER STUDIES OF CASCADE VOLCANOES -  
 WASHINGTON, OREGON AND CALIFORNIA 14.0006  
 WEATHER SATELLITE CAPABILITIES - PRESENT AND  
 FUTURE 16.0067  
 FEDERAL PLAN FOR WEATHER RADARS 16.0068  
 FEDERAL PLAN FOR METEOROLOGICAL SERVICES &  
 SUPPORTING RESEARCH - FISCAL YEAR 1973  
 16.0069  
 PLAN TO IMPROVE LOCAL WEATHER FORECASTS  
 16.0072  
 OPERATIONS OF THE NATIONAL WEATHER SERVICE  
 16.0092  
*Geophysical Modification*  
 PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD  
 SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED  
 BY ATMOSPHERICS INCORPORATED (ABBREV)  
 2.0008  
 HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I  
 2.0009

NETWORK ON THE ALASKA PENINSULA  
 OF BASE ROCK CHARACTERISTICS ON  
 RESPONSE ...3.0083  
 TIONS IN ROCK FOR EARTHQUAKES IN THE  
 UNITED STATES ...3.0092  
 TION OF SEISMOGRAPH RECORDS FOR EF-  
 F LOCAL SOIL CONDITIONS ...3.0093  
 EFACATION DURING EARTHQUAKES ...3.0103  
 ACTIVITY OF MULTIPLE FAULT STRANDS -  
 NIA ...3.0105  
 ONE TECTONICS (CREEP) - CALIFORNIA  
 KE MODELING ...3.0114  
 KE CONTROL EXPERIMENT - MINNESOTA  
 THQUAKE DATA ANALYSIS ...3.0119  
 CALIFORNIA ...3.0123  
 AND DETAILED GRAVITY STUDIES IN TEC-  
 LY ACTIVE AREAS - CALIFORNIA ...3.0124  
 MICROEARTHQUAKE NETWORKS - ALABAMA  
 AS ...3.0125  
 URCE STUDIES - CALIFORNIA ...3.0130  
 ND TILTS ASSOCIATED WITH THE SAN FER-  
 EARTHQUAKE ...3.0145  
 ND, WASHINGTON, EARTHQUAKE AND THE  
 STRUCTURE BENEATH THE  
 ESTERN UNITED STATES ...3.0146  
 PLACEMENT ON THE CALAVERAS FAULT  
 HOLISTER, CALIFORNIA ...3.0156  
 NYON AND AUBURN DAM SEISMICITY -  
 OO ...3.0166  
 OLINA SEISMICITY PROGRAM ...3.0168  
 RID EARTHQUAKE - ARKANSAS, ILLINOIS,  
 Y, MISSISSIPPI, MISSOURI AND TENNESSEE  
 ANALYSIS OF SEISMICALLY ACTIVE ZONES  
 DA, IN SUPPORT OF EARTHQUAKE CON-  
 PERIMENT - CALIFORNIA, NEVADA, UTAH  
 OF LIQUEFACTION OF SATURATED GRANU-  
 S DURING EARTHQUAKES ...3.0209  
 SEISMICITY - MILROW SEISMIC EFFECTS  
 BODY-WAVE MAGNITUDES OF ALEUTIAN  
 AKES ...3.0222  
 KE INDUCED TRANSIENT PORE PRESSURES  
 I DAMS ...3.0231  
 ION SUSCEPTIBILITY OF SOILS UNDER  
 C AND STATIC LOADING ...3.0234  
 UND MOTION AND INTENSITY RELATIONS  
 CENTRAL UNITED STATES ...3.0235

MEASUREMENTS FOR FAULT SLIP ON THE DENALI,  
 FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS,  
 ALASKA ...3.0259  
 SEISMICITY INVESTIGATIONS IN THE CASCADE MOUN-  
 TAINS AND VICINITY, OREGON, 1 MAY 1969 - 30  
 APRIL 1970 ...3.0266  
 LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON  
 ...3.0267  
 SEISMICITY AND CONTEMPORARY TECTONICS OF THE  
 YELLOWSTONE PARK-HEBGEN LAKE REGION  
 ...3.0275  
 MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
 ...10.0015  
 SUBSIDENCE AND RELATED ASPECTS OF GEOTHER-  
 MAL SYSTEMS ...10.0017  
 RELATIVE SPECTRA OF TSUNAMIS ...13.0022  
 THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
 SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
 GRAM - WASHINGTON, OREGON AND CALIFORNIA  
 ...14.0008

### *Hazard Delineation*

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
 ...1.0009  
 PHYSICAL PROPERTIES OF ALPINE SNOW AS RELATED  
 TO WEATHER AND AVALANCHE CONDITIONS  
 ...1.0012  
 DROUGHT CLIMATOLOGY OF ILLINOIS ...2.0011  
 DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR  
 PUERTO RICO ...2.0022  
 TOWARD REDUCTION OF LOSSES FROM  
 EARTHQUAKES ...3.0186  
 REPORT OF THE TASK FORCE ON EARTHQUAKE  
 HAZARD REDUCTION PROGRAM PRIORITIES ...3.0200  
 UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
 DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
 ALS ...4.0008  
 REDUCING FIRE HAZARD IN PONDEROSA PINE THIN-  
 NING SLASH BY MECHANICAL CRUSHING - OREGON  
 ...5.0037  
 THE INFLUENCE OF WEATHER AND CLIMATE ON  
 FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
 EAST AND SOUTH ...5.0043  
 DEVELOPMENT OF EMISSION FACTORS FOR ESTIMAT-  
 ING ATMOSPHERIC EMISSIONS ...5.0044  
 FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN  
 ...5.0045  
 FIRE ON A FOREST SOIL ...5.0047  
 LAKE HYDROLOGY ...6.0207  
 HYDROGRAPH MODEL STUDIES OF THE HILL-  
 SBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS,  
 FLORIDA ...6.0234

WATER RESOURCE PLANNING AND DEVELOPMENT - THE CONNECTICUT RIVER BASIN ...6.0292  
 FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327  
 STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348  
 THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357  
 ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...6.0359  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392  
 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

#### *Preparedness Planning*

A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS ...3.0161  
 A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA ...3.0162  
 DENVER URBAN CORRIDOR STUDIES - COLORADO ...4.0005  
 FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES ...6.0225  
 FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES ...6.0229  
 NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973 ...6.0253  
 PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330  
 FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION ...6.0391  
 PILOT STUDY OF FLOOD PLAIN MANAGEMENT - WASHINGTON ...6.0402  
 THE EFFECTS OF HURRICANE CAMILLE ON INDUSTRY, PUBLIC UTILITIES, AND PUBLIC WORKS OPERATIONS ...8.0056  
 HURRICANE PREPAREDNESS AND CONTROL PLAN ...8.0083  
 MICROWAVE METEOROLOGY ...8.0104  
 PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION TASK COMPLETION REPORT ...16.0051  
 THE DEVELOPMENT OF A MEANS FOR ASSESSING EMERGENCY MEDICAL RESOURCES ...16.0052  
 NATURAL DISASTER OPERATIONS PLANNING ...16.0053  
 EMERGENCY OPERATIONS CONTINGENCY PLANNING - NEW ORLEANS, LOUISIANA ...16.0059

A FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS ...16.0071  
 REPORT TO THE CONGRESS - DISASTER PREPAREDNESS ...16.0077  
 SECURING COMMUNITY RESOURCES FOR SOCIAL ACTION ...16.0087  
 METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER ...16.0105  
 EXPEDIENT AM AND FM BROADCAST ANTENNAS ...16.0107  
 AREA-WIDE DISASTER RESPONSE - CIVIL PREPAREDNESS AND REGIONAL COUNCILS ...16.0108

#### *Research and Modeling*

PUGET PEAK AVALANCHE, ALASKA ...1.0007  
 THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018  
 THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087  
 SOUTHERN CALIFORNIA TECTONICS ...3.0112  
 REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF BORRERO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (ABBREV) ...3.0113  
 MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120  
 EARTHQUAKE HAZARDS REDUCTION--NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128  
 AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129  
 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA ...3.0133  
 CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135  
 STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA ...3.0138  
 CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES ...3.0139  
 A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147  
 MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT ...3.0155  
 SEISMICITY AND EARTH STRUCTURE ...3.0167  
 V. A. HOSPITAL SITE EVALUATIONS ...3.0177  
 SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO ...3.0178  
 DENVER EARTHQUAKES ...3.0217  
 THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967 ...3.0221



Y - ARKANSAS, MISSISSIPPI AND TEN-  
 0236  
 E TABLES FOR EARTHQUAKES IN THE  
 UNITED STATES ...3.0239  
 IN EARTH STRAINS AND FOCAL  
 MS - MISSOURI ...3.0240  
 UDIES - SOUTH CENTRAL ILLINOIS  
 KE OF NOVEMBER 9, 1968 ...3.0241  
 OF THE SOUTHERN NEVADA REGION,  
 22, 1971 TO JULY 1, 1972 ...3.0245  
 ES RECORDED BY A SEISMOGRAPH NET-  
 CATED IN THE SOUTHERN NEVADA RE-  
 JARY 1-DECEMBER 22, 1971 ...3.0246  
 EISMIC PROGRAM HYPOCENTER SUMMA-  
 ER 1972-APRIL 1973 ...3.0247  
 AND PREMONITORY VARIATIONS OF P, S  
 MES ...3.0248  
 E DISTRIBUTION AND MECHANISM OF  
 IN THE RAINBOW MOUNTAIN-DIXIE VAL-  
 IEW PEAK AREA, CENTRAL NEVADA  
 ON OF BRITTLE STRUCTURES WITHIN NEW  
 TE ...3.0256  
 ICITY AND TECTONICS OF THE NEVADA  
 ONE ...3.0258  
 ETRY, AND STRESS FIELDS OF FOUR  
 ULTS OF THE CALIFORNIA TRANSVERSE  
 Y EVALUATION OF WELL DATA ...3.0264  
 ES INDUCED BY UNDERGROUND FLUID  
 ...3.0272  
 IOR UNDER EARTHQUAKE LOADING CON-  
 3.0278  
 ABILITY OF EARTH STRUCTURES ...3.0279  
 F SEISMICITY AND CRUSTAL STRUCTURE  
 ERN WASHINGTON USING A SEISMIC  
 Y NETWORK ...3.0280  
 ONMENTAL TEST CHAMBER - ITS DESIGN  
 IOPMENT ...5.0033  
 N MODEL FOR FIREFIGHTING RESOURCES  
 E HISTORY - A COMPUTER METHOD OF  
 LYSIS ...5.0038  
 RE METEOROLOGY IN THE PACIFIC  
 REGION ...5.0040  
 E STATISTICAL PROBLEMS ...5.0041  
 DING POTENTIAL FOR TWELVE RIVER  
 0171  
 ION FOR FLOOD PROTECTION OF BRIDGES  
 Y OF OUTSTANDING FLOODS ...6.0211  
 ION OF SCOUR AT BRIDGES IN ALASKA  
 E OF GEORGIA STREAMS ...6.0241  
 OM SMALL AGRICULTURAL AREAS IN IL-  
 0265

WICHITA AREA ...6.0281  
 OPSET - PROGRAM FOR COMPUTERIZED SELECTION  
 OF WATERSHED PARAMETER VALUES FOR THE  
 STANFORD WATERSHED MODEL ...6.0285  
 CLIMATES OF THE STATES - CLIMATE OF NEW YORK  
 ...6.0289  
 WATER RESOURCES OF THE RED RIVER OF THE  
 NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303  
 THE USE OF SYSTEMS ANALYSIS IN THE DEVELOP-  
 MENT OF WATER RESOURCES MANAGEMENT PLANS  
 FOR NEW YORK STATE - VOLUME I ...6.0328  
 HYDROLOGIC EFFECTS OF URBANIZATION IN THE  
 UNITED STATES ...6.0338  
 DRAINAGE STUDY - INVENTORY AND ANALYSIS  
 ...6.0340  
 A COMPILATION OF FLOOD ABATEMENT PROJECTS IN  
 OREGON ...6.0353  
 EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN  
 PENNSYLVANIA ...6.0361  
 HYDROLOGIC STUDIES OF SMALL RURAL TEXAS  
 WATERSHEDS ...6.0375  
 EFFECTS OF URBANIZATION ON FLOODS IN THE  
 HOUSTON, TEXAS METROPOLITAN AREA ...6.0376  
 VARIATION OF URBAN RUNOFF WITH DURATION AND  
 INTENSITY OF STORMS - TEXAS ...6.0387  
 NUMERICAL STUDIES OF UNSTEADY FLOW IN THE  
 JAMES RIVER - VIRGINIA ...6.0396  
 STORM CHARACTERISTICS AND RAINFALL INTENSITY  
 IN WEST VIRGINIA ...6.0406  
 NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT  
 FOR 1973 - COLORADO ...7.0010  
 THE NATIONAL HAIL RESEARCH EXPERIMENT  
 SUMMER 1973 SUMMARY REPORT ...7.0011  
 HAIL AND LIGHTNING - COLORADO ...7.0012  
 EXTENDED AREA EFFECTS FROM LOCAL WEATHER  
 MODIFICATION ...7.0013  
 NATIONAL HAIL RESEARCH EXPERIMENT -  
 COLORADO, NEBRASKA, WYOMING ...7.0014  
 DESIGN OF HAIL SUPPRESSION EXPERIMENT IN IL-  
 LINOIS ...7.0015  
 TRACER STUDIES IN THE NATIONAL HAIL RESEARCH  
 EXPERIMENT (NHRE) ...7.0017  
 PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT  
 II DATA (WAVE FORCES ON A PILE), HURRICANE  
 CARLA, GULF OF MEXICO ...8.0051  
 TROPICAL CYCLONE ENERGY TRANSFER ...8.0054  
 TROPICAL CYCLONES ...8.0055  
 HURRICANE MODIFICATION ...8.0057  
 A PRELIMINARY VIEW OF STORM SURGES BEFORE  
 AND AFTER STORM MODIFICATIONS ...8.0059  
 STORM SURGE RESEARCH ...8.0060  
 HURRICANE MODELING ...8.0062  
 HURRICANE-TYPHOON DYNAMICS ...8.0063  
 HURRICANE-OCEAN INTERACTION ...8.0064

- SEA-AIR INTERACTION - LABORATORY OPERATIONS  
8.0065
- INVESTIGATION OF SATELLITE OBSERVED TYPHOON-  
HURRICANE CLOUD CLUSTERS AND FLOW FEAT-  
URES ..8.0066
- STUDIES OF CUMULUS HEATING AND THE CISK  
MECHANISM ..8.0067
- THE STRUCTURE AND DYNAMICS OF THE HUR-  
RICANE'S INNER CORE REGION ..8.0069
- A SURVEY OF AVAILABILITY OF HUR-  
RICANE/TYPHOON PACKAGES AND ASSOCIATED  
DATA ..8.0071
- STORM SURGE ON THE OPEN COAST - FUNDAMEN-  
TALS AND SIMPLIFIED PREDICTION ..8.0072
- ATLANTIC TROPICAL CYCLONE STRIKE PROBABILI-  
TIES - VOLUME I - 24 HOUR MOVEMENT ..8.0080
- ATLANTIC TROPICAL CYCLONE STRIKE PROBABILI-  
TIES - VOLUME II - 48 HOUR MOVEMENT ..8.0081
- ATLANTIC TROPICAL CYCLONE STRIKE PROBABILI-  
TIES - VOLUME III - 72 HOUR MOVEMENT ..8.0082
- ATLANTIC TROPICAL SYSTEMS OF 1972 ...8.0084
- HURRICANE DEBBIE MODIFICATION EXPERIMENTS,  
AUGUST 1969 ..8.0085
- OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERA-  
TURES (SST) ...8.0087
- CIRCULATION FEATURES OF TROPICAL CYCLONES  
...8.0088
- LANDFALL ERRORS IN HURRICANE FORECASTS  
...8.0094
- PROJECT STORMFURY ANNUAL REPORT 1971 ...8.0095
- HURRICANE MODIFICATION BY CLOUD SEEDING  
...8.0096
- USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098
- THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL  
DISTURBANCES ...8.0099
- BEACH CHANGES BY EXTRAORDINARY WAVES  
CAUSED BY HURRICANE CAMILLE ..8.0103
- HURRICANE MODIFICATION RESEARCH (PROJECT  
STORMFURY) ...8.0107
- SUMMARY OF SELECTED REFERENCE MATERIAL ON  
THE OCEANOGRAPHIC PHENOMENA OF TIDES,  
STORM SURGES, WAVES, AND BREAKERS ..8.0114
- NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH  
...8.0117
- MICRO AND MESOSCALE GEOPHYSICAL FLUID  
DYNAMICS ...8.0120
- CASE STUDIES OF COASTAL CONVECTIVE STORMS AS  
OBSERVED BY DOPPLER RADAR ...8.0121
- PRELIMINARY CLIMATIC DATA REPORT HURRICANE  
AGNES JUNE 14-23, 1972 ...8.0123
- NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN  
TROPICAL CYCLONES ...8.0125
- ANALYTICAL PHYSICAL MODEL ...8.0126
- OBJECTIVE ANALYSIS OF THE SEA SURFACE TEM-  
PERATURE ...8.0129
- ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S.  
COASTLINE ...8.0132
- ENERGY AND MOMENTUM FLUXES OF EXTRATROPICAL CYCLONES ...8.0137
- NUMERICAL STUDIES IN THE CIRCULATIONS AND  
STORM SURGES IN LAKE ONTARIO ...8.0138
- MECHANICS OF DEBRIS AVALANCHING IN SHALLOW  
TILL SOILS OF SOUTHEAST ALASKA ...9.0024
- COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE  
PROTECTION FOR EARTH EMBANKMENTS ...9.0025
- GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029
- MONTEREY BAY - CALIFORNIA ...9.0030
- MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034
- DEFORMATION CHARACTERISTICS OF HILL SLOPES &  
CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS  
DEPICTED BY REMOTE SENSOR RETURNS - CALIFOR-  
NIA ...9.0036
- EVALUATION OF 'ION EXCHANGE' LANDSLIDE COR-  
RECTION TECHNIQUE - CALIFORNIA ...9.0038
- EVALUATION OF THE ION EXCHANGE LANDSLIDE  
CORRECTION TECHNIQUE ...9.0039
- SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...9.0046
- EVALUATION OF CRITERIA FOR LANDSLIDE ANALYSIS  
AS PRESENTED IN THE U.S.G.S. ...9.0047
- EFFECTS OF FOREST CLEAR-CUTTING ON THE STABI-  
LITY OF NATURAL SLOPES ...9.0052
- ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSIS-  
SIPPI ...9.0053
- ROCK STRENGTH FROM FAILURE CASES ...9.0054
- TREE-RING DATING & SPATIAL ANALYSIS OF LONG-  
TERM SLOPE MOVEMENTS - UTAH ...9.0055
- THE INFLUENCE OF CLAY MINERALS ON SURFICIAL  
EARTH MOVEMENTS ...9.0056
- LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057
- STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059
- ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL  
MASSES - ALASKA AND OHIO ...9.0060
- DEVELOPMENT OF CRITERIA FOR RECOGNIZING &  
IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED  
BY REMOTE SENSOR RETURNS - NORTH CAROLINA  
...9.0063
- PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-  
30, 1970 ...12.0024
- LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS  
...12.0025
- DOPPLER RADAR METHODOLOGY FOR THE OBSERVA-  
TION OF CONVECTIVE STORMS ...12.0026
- EM RADIATION-TORNADOES ...12.0027
- PROPOSED CHARACTERIZATION OF TORNADOES AND  
HURRICANES BY AREA AND INTENSITY ...12.0031
- HYDROMETEOROLOGICAL ANALYSIS OF SEVERE  
RAINSTORMS - ILLINOIS ...12.0033

- ...12.0039
- PERIOD SURFACE WAVES IN  
...13.0012
- INVESTIGATIONS OF GENERA-  
WAVES AND OF RESONANT  
ORS TO TSUNAMIS AND OTHER  
16
- AND SURGES ...13.0019
- ON OF TSUNAMIS ...13.0020
- ALOG ...13.0021
- ORY ...13.0023
- TRACT ...13.0024
- I IN THE HAWAIIAN ISLANDS
- ON OF THE PROPOSED CRESCENT  
MMI MODEL ...13.0026
- PERIMENTAL DATA RELATIVE  
EL STUDY FOR THE DESIGN OF  
MMI MODEL ...13.0027
- F LARGE AMPLITUDE TSUNAMIS  
CHANGING DEPTH - OFF-SHORE
- CE OF AUGUSTINE REDOUBT  
ANOES, COOK INLET, ALASKA
- DLOGY - WESTERN UNITED  
ALASKA AND HAWAII ...14.0014
- AMINATION BY VOLCANIC  
KILAUEA VOLCANO, HAWAII
- F THE CASCADE VOLCANOES
- ...15.0013
- E CHANGES AND COASTAL ERO-  
SKA ...15.0014
- EVALUATION - CALIFORNIA,
- HAWAIIAN WATERSHED AND  
NTS ...15.0018
- IN ILLINOIS ...15.0020
- ETS - FORMS OF SEDIMENT AC-  
E BEACH ZONE - ALASKA, NEW
- STUDIES, MASSACHUSETTS
- OR STORM CYCLES AND BEACH  
ICHIGAN ...15.0024
- WIND, WAVES AND EROSION  
ERN SHORE OF LAKE MICHIGAN
- OMORPHIC STUDY OF THE  
ALONG THE SOUTH SHORE OF  
YORK ...15.0027
- COAST ...15.0033
- EROSION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA-  
BLE SOILS IN THREE SMALL WESTERN OREGON  
WATERSHEDS ...15.0034
- PROPERTIES AND STABILITY OF A TEXAS BARRIER  
BEACH INLET ...15.0035
- TEXAS BARRIER ISLANDS ...15.0037
- ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038
- SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLO-  
GY IN THE CENTRAL APPALACHIAN REGION - VIR-  
GINIA ...15.0039
- ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
NADOES AND HURRICANES ...16.0057
- WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
AND PROGRESS ...16.0063
- WEATHER & CLIMATE MODIFICATION PROBLEMS AND  
PROGRESS ...16.0066
- NATIONAL ATMOSPHERIC SCIENCES PROGRAM -  
FISCAL YEAR 1974 ...16.0076
- CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS  
ON PRECIPITATION - PART I ...16.0082
- WEATHER MODIFICATION - FISCAL YEARS 1969, 1970,  
1971 ...16.0090
- Risk Mapping*
- SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...1.0010
- NEBRASKA DROUGHTS - A STUDY OF THEIR PAST  
CHRONOLOGICAL AND SPATIAL EXTENT WITH IM-  
PLICATIONS FOR THE FUTURE ...2.0016
- METEOROLOGICAL DROUGHT IN TENNESSEE ...2.0024
- EVALUATION OF FEASIBILITY OF MAPPING SEISMI-  
CALLY ACTIVE FAULTS IN ALASKA ...3.0071
- SEISMICITY OF MENDOCINO ESCARPMENT-GORDA  
RIDGE REGION - CALIFORNIA ...3.0080
- OPTIMIZATION OF WATER RESOURCE SYSTEMS IN-  
CORPORATING EARTHQUAKE RISK ...3.0102
- MICROEARTHQUAKE MONITORING IN LOS ANGELES  
AREA ...3.0104
- REGIONAL GEOLOGICAL FRAMEWORK, NORTH CEN-  
TRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108
- SAN ANDREAS FAULT - CALIFORNIA COOP ...3.0111
- TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL  
MARGIN - ALASKA ...3.0131
- CALIFORNIA M/EQ NET ...3.0134
- EVALUATION OF THE INCREMENTAL SEISMIC RISK  
DUE TO RESERVOIR FILLING ...3.0142
- THE SEISMIC RISK MAP OF THE UNITED STATES -  
DEVELOPMENT, USE, AND PLANS FOR FUTURE  
REFINEMENT ...3.0160
- RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

SEISMIC RISK STUDIES IN THE UNITED STATES ...3.0219  
 STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE  
 HAZARDS IN THE UNITED STATES. REPORT I  
 ...3.0233  
 A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
 OF THE ALEUTIAN ARC - ALASKA ...3.0262  
 TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC  
 METHODS ...3.0263  
 SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
 REGION ...3.0277  
 GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
 ...4.0004  
 MAPPING OF SURFACE MATERIALS FOR PREDICTING  
 FOUNDATION CHARACTERISTICS IN FUTURE  
 DEVELOPMENT OF HATTIESBURG ...4.0009  
 FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
 AND MAPPING OF FIRES ...5.0046  
 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
 ...6.0185  
 INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION  
 TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209  
 IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS  
 ...6.0218  
 GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
 TIALS IN THE SINK AREAS OF SOUTH WESTERN  
 SEMINOLE COUNTY, FLORIDA ...6.0230  
 FLOOD INUNDATION MAPPING, NORTHEASTERN IL-  
 LINOIS ...6.0261  
 EVALUATION OF FLOOD RISKS ...6.0264  
 USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK  
 ON TEN TASKS ...6.0298  
 CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
 STUDY ...6.0310  
 CITY OF JACKSON WATER RESOURCES STUDY ...6.0311  
 HYDROLOGY OF STREAMS IN ST. LOUIS  
 METROPOLITAN AREA ...6.0317  
 FLOODPLAIN MAPPING AND PLANNING FOR THE 50  
 AND 100 YEAR INTERVAL FLOOD ZONES OF THE  
 BITTERROOT VALLEY, MONTANA ...6.0321  
 STREAMS AND DRAINAGE BASINS - FULTON COUNTY,  
 NEW YORK ...6.0329  
 FLOOD PLAIN INUNDATION ...6.0364  
 EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO  
 BAY REGION ...9.0028  
 DENVER METROPOLITAN AREA, COLORADO ...9.0042  
 ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...13.0013  
 TSUNAMI RESEARCH AND ENGINEERING APPLICA-  
 TIONS ...13.0015  
 ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
 OF COASTAL COMMUNITIES, ALASKA ...13.0017  
 RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
 SITKA AREA, ALASKA ...13.0018

## Land Use and Development

*See Hazard Reduction*

## Land Use Practices

*See Hazard Reduction*

*Land Use and Development*

## Legal Services

*See Assistance - Individual*

## Legislation

*See Hazard Reduction*

## Management Disaster Operations

*See Hazard Reduction*

## Mass Care

*See Assistance - Individual*

## Medical and Health Services

*See Assistance - Individual*

## Model Building Codes

*See Hazard Reduction*

*Construction Practices*

## Ordinances

*See Hazard Reduction*

*Land Use and Development*

## Parks and Recreational Areas

*See Assistance - Public*

*Restoration & Repair*

*See Hazard Reduction*

## **Standards**

*See Hazard Reduction  
Construction Practices*

## **Subdivision Regulations**

*See Hazard Reduction  
Construction Practices  
Land Use and Development*

## **Temporary Housing**

*See Assistance - Individual*

## **Transportation**

*See Assistance - Public  
Restoration & Repair*

## **Unemployment Assistance**

*See Assistance - Individual*

## **Utilities**

*See Assistance - Public  
Restoration & Repair*

## **Volunteer Organization**

*See Assistance - Individual*

## **Vulnerability Analysis**

*See Hazard Reduction*

## **Warning Systems**

*See Disaster Mitigation  
Disaster Warning*

## **Zoning**

*See Hazard Reduction  
Land Use and Development*



Artificial Recharge  
*See Water Supply*

Atmosphere Disturbance  
*See Meteorology*

Atmospheric Energy  
*See Meteorology*

Atmospheric Radiation  
*See Meteorology*

Atomic Plants

Automatic Data Acquisition  
*See Techniques and Instrumentation*  
 Data Acquisition

Automatic Stations — Networks  
*See Meteorology*  
 Techniques and Instrumentation

Automobile and Components  
*See Transportation Engineering*

Aviation Safety — Survival  
*See Aeronautics and Aerodynamics*

Axial  
*See Engineering Mechanics*  
 Forces and Loadings

Backfills  
*See Soil Science and Mechanics*

Barriers  
*See Geomorphology*  
 Shoreline Geomorphology

Bars  
*See Geomorphology*  
 Shoreline Geomorphology  
*See Mechanics of Structures*

Basalt  
*See Igneous Rocks*

Base Flow of Streams

Baseline Studies  
*See Water Quality*  
 Water Quality Control

Basins  
*See Structural Geology*  
 Tectonic Features

Bathymetry  
*See Oceanography*  
 Oceanographic Techniques

Bathithermographs  
*See Oceanography*  
 Oceanographic Instrumentation

*See Mechanics of Structures*

Bearing Capacity  
*See Soil Science and Mechanics*

Bench Leveling  
*See Techniques and Instrumentation*

Land Forming

Bending  
*See Engineering Mechanics*  
 Stresses

Benthic Environment

Bibliography  
*See Publications*

Bicycling  
*See Recreation*  
 Recreation Activities

Biological  
*See Water Quality*  
 Water Properties

Biological Oceanography  
*See Oceanography*

Biological Oxygen Demand Test  
*See Techniques and Instrumentation*

Biomes, Terrestrial  
*See Ecology*

Blood Banks

Boating  
*See Recreation*  
 Recreation Activities

Body Waves  
*See Geophysics*  
 Seismology

Borehole Logging  
*See Techniques and Instrumentation*

Bottom Sampling Devices  
*See Oceanography*  
 Oceanographic Instrumentation

Bottom Topography  
*See Oceanography*  
 Marine Geology

Boundary Layer Studies  
*See Meteorology*

Breakwaters  
*See Hydraulics*

Bridge Sites  
*See Geomorphology*  
 Engineering Geology

*See Economics*

Cost Analysis

**Building Fire**  
*See Fire Research*  
 Types of Fire

**Building and Land Development**  
*Building Classification*  
 Commercial  
 Educational Facilities  
 High-rise  
 Hospitals  
 Low Cost Housing  
 Manufacturing  
 Military  
 Mining  
 Mobil Homes  
 Public Service  
 Recreational  
 Residential  
 Utilities  
 Water Supply Facility  
*Components and Equipment*  
 Floors  
 Piping Systems  
 Roofs  
 Walls  
*Construction*  
 Codes and Standards  
 Cost Financing  
 Earthquake-type  
 Excavation  
 Methods  
 Sites  
 Under-water  
*Design*  
 Codes and Standards  
 Environmental  
 Structural  
*Fire Considerations*  
*Land Use and Development*  
 Impact of Land Use  
 Planning  
 Zoning  
*Maintenance*  
*Models*  
*Safety*  
*Testing*

**Bulkheads**  
*See Hydraulics*

Instrumentation	<b>Climatology</b> <i>See Meteorology</i>	<b>Compressive</b> <i>See Engineering Mechanics</i>
	<b>Clinical Psychology</b>	Stresses
and Mechanics	<b>Clouds</b> <i>See Meteorology</i>	<b>Compressive Strength</b> <i>See Soil Science and Mechanics</i>
	<b>Coal</b> <i>See Economic Geology</i>	Mechanical Properties
ics	Non-metallic Deposits	<i>See Structural Geology</i>
	<b>Coastal Engineering</b> <i>See Hydraulics</i>	Rock Mechanics
Structures	<b>Coastlines — Shorelines</b>	<b>Computer Methods</b> <i>See Techniques and Instrumentation</i>
oles	<b>Codes and Standards</b>	<b>Computer Models</b> <i>See Techniques and Instrumentation</i>
gy	<i>See Buildings and Land</i>	Model Studies
tures	Development	<b>Computer Programming</b>
	Construction	<b>Computer Usage</b>
ics	Design	<b>Concrete Structures</b> <i>See Mechanics of Structures</i>
	<b>Cohesion</b> <i>See Soil Science and Mechanics</i>	<b>Condensation Physics</b> <i>See Meteorology</i>
and Instrumentation	Mechanical Properties	Meteorological Condensation
s	<b>Color</b> <i>See Water Quality</i>	<b>Conduits</b> <i>See Hydraulics</i>
s	Water Properties	<b>Congestion</b> <i>See Transportation Engineering</i>
Measurement	<b>Columns</b> <i>See Mechanics of Structures</i>	Traffic Engineering
and Instrumentation	<b>Combined Sewers</b> <i>See Waste Water</i>	<b>Conjunctive Use</b> <i>See Water Supply</i>
ring	Treatment/Disposal	<b>Conservation</b> <i>See Soil Science and Mechanics</i>
ns	Sewage System	<i>See Water Supply</i>
	<b>Combustion</b> <i>See Fire Research</i>	<i>Consolidation Test</i> <i>See Soil Science and Mechanics</i>
	<b>Commercial</b> <i>See Buildings and Land</i>	Techniques and Instrumentation
Civil Defense	Development	<b>Construction</b> <i>See Buildings and Land</i>
	Building Classification	Development
	<b>Communication</b>	<i>See Hydraulics</i>
	<b>Communication Systems</b> <i>See Electronic Systems</i>	<i>See Transportation Engineering</i>
and Mechanics	<b>Communication Theory</b> <i>See Information Systems Research</i>	<b>Construction Industry</b>
	<b>Community Health Services</b> <i>See Public Health</i>	<b>Construction Surveying</b> <i>See Techniques and Instrumentation</i>
	<b>Community Mental Health Center</b> <i>See Public Health</i>	Surveying Methods
	Community Health Services	<b>Continental Shelf</b>
	<b>Community Studies</b> <i>See Social Sciences</i>	<b>Continental Shelves</b> <i>See Oceanography</i>
	<b>Compaction Test</b> <i>See Soil Science and Mechanics</i>	Marine Geology
	Techniques and Instrumentation	<b>Continental Slopes</b> <i>See Oceanography</i>
		Marine Geology



Equipment  
*See* Information Systems Research  
**Control Systems**  
*See* Information Systems Research  
**Control Theory**  
*See* Information Systems Research  
**Convection**  
*See* Meteorology  
**Convection Currents**  
*See* Geophysics  
**Geothermal Properties**  
**Core Analysis**  
*See* Techniques and Instrumentation  
**Correlation**  
*See* Stratigraphy  
**Corrosion, Deterioration**  
**Cost Analysis**  
*See* Economics  
*See* Information Systems Research  
**Economic Theory**  
**Cost Financing**  
*See* Buildings and Land Development  
**Construction**  
**Cost-benefit Analysis**  
*See* Economics  
**Cost Analysis**  
**Counties**  
**Coupled**  
*See* Engineering Mechanics  
**Mechanical Vibrations**  
**Cover Crops**  
*See* Soil Science and Mechanics  
**Credit**  
*See* Economics  
**Income Analysis**  
**Creep**  
*See* Geomorphology  
**Mass Wasting**  
**Creep and Rheology**  
*See* Soil Science and Mechanics  
**Mechanical Properties**  
**Criminology**  
*See* Social Sciences  
**Crushed Rock**  
*See* Economic Geology  
**Non-metallic Deposits**

*See* Structural Geology  
**Tectonic Features**  
**Crustal History**  
*See* Stratigraphy  
**Geologic History**  
**Crustal Movement Detectors**  
*See* Geophysics  
**Geophysical Instrumentation**  
**Crystalline Rocks**  
*See* Igneous Rocks  
**Culverts**  
*See* Hydraulics  
**Cuts**  
*See* Soil Science and Mechanics  
**Earth Structures**  
**Cyclones — Anticyclones**  
*See* Meteorology  
**Atmosphere Disturbance**  
**Daily Discharge**  
*See* Hydraulics  
**Discharge**  
**Dam Sites**  
*See* Geomorphology  
**Engineering Geology**  
**Damage Losses**  
*See* Recreation  
**Damping**  
*See* Engineering Mechanics  
**Mechanical Vibrations**  
**Dams**  
*See* Hydraulics  
*See* Soil Science and Mechanics  
**Earth Structures**  
**Data Acquisition**  
*See* Techniques and Instrumentation  
**Data Analysis**  
*See* Techniques and Instrumentation  
**Data Networks**  
*See* Techniques and Instrumentation  
**Data Acquisition**  
**Data Reduction and Analysis**  
*See* Information Systems Research  
**Deep Submersibles**  
*See* Oceanography  
**Oceanographic Instrumentation**  
**Deflection**  
*See* Engineering Mechanics

*See* Soil Science and Mechanics  
**Mechanical Properties**  
*See* Structural Geology  
**Tectonics**  
**Deltas**  
**Demand**  
*See* Economics  
**Income Analysis**  
**Demography**  
*See* Social Sciences  
**Dendrochronology**  
*See* Forestry  
**Density**  
*See* Soil Science and Mechanics  
**Physical Properties**  
**Depositional Features**  
*See* Glaciology  
**Glacial Features**  
**Depth**  
*See* Oceanography  
**Sea Water Properties**  
*See* Water Quality  
**Water Properties**  
**Desalination**  
*See* Water Quality  
**Water Quality Control**  
**Deserts**  
**Design**  
*See* Buildings and Land Development  
*See* Hydraulics  
*See* Transportation Engineering  
**Detection and Measurement**  
*See* Air Pollution  
**Detection, Warning**  
*See* Fire Research  
**Fire Control**  
**Detectors**  
*See* Electronic Systems  
**Diagenesis**  
*See* Sedimentology  
**Diffusion Flame**  
*See* Fire Research  
**Dikes**  
*See* Hydraulics  
**Dimensional Effect**  
*See* Engineering Mechanics  
**Direct Shear and Plane Shear**  
*See* Soil Science and Mechanics



**Electromagnetic Probing**  
*See Geophysics*  
**Electrical Properties**  
**Electromagnetic Radiation**  
*See Techniques and Instrumentation*  
**Remote Sensing**  
**Electronic Systems**  
*Antennas*  
*Communication Systems*  
**Emergency Communication**  
**Global Communication**  
**Radio Communication**  
**Satellite Communication**  
**Space Communication**  
**Telecommunication Networks**  
**Telemetry**  
**Weather Communication**  
*Detectors*  
*Marine Navigation Systems*  
*Microwave Techniques*  
*Remote Control Systems*  
*Sensing Systems*  
**Infrared Systems**  
**Radio Detection Systems**  
**Remote Sensing Systems**  
*Signal Analysis*  
*Testing Facilities*  
*Warning Systems*  
**Embankments**  
*See Soil Science and Mechanics*  
**Earth Structures**  
**Emergency Communication**  
*See Electronic Systems*  
**Communication Systems**  
**Emergency Non-hospital Service**  
*See Public Health*  
**Community Health Services**  
**Emergency Power Generation**  
*See Electric Power Systems*  
**Emergency Service**  
*See Hospital and Medical Facilities*  
**Hospital Services and Units**  
**Emergency Vehicles**  
*See Transportation Engineering*  
**Transportation Systems**  
**Energy Conversion**  
*Environmental Aspects*  
*Fossil Fuels*  
*Natural Energy Sources*  
**Geothermal**

**Energy Dissipators**  
*See Mechanical Power and Equipment*  
**Control Devices**  
**Energy Loss**  
*See Hydraulics*  
**Enforcement Personnel**  
*See Occupations, Populations*  
**Engineering Geology**  
*See Geomorphology*  
**Engineering Mechanics**  
*Analysis*  
**Elastic**  
**Graphical**  
**Plastic**  
**Strain Gauges**  
*Deflection*  
*Deformation*  
*Dimensional Effect*  
*Elastic Wave Propagation*  
*Failure*  
*Fatigue*  
*Forces and Loadings*  
**Axial**  
**Dynamic**  
**Impact and Shock**  
**Live Load**  
**Periodic**  
**Random**  
**Static**  
**Transverse**  
**Wind**  
*Fracture Mechanics*  
*Hysteresis*  
*Mechanical Vibrations*  
**Coupled**  
**Damping**  
**Excitation**  
**Frequency**  
**Linear**  
**Response**  
**Stiffness and Flex**  
*Moments*  
*Stability*  
*Strain*  
**Elastic**  
**Plastic**  
**Shear**  
*Strength*  
*Stresses*  
*Bending*  
**Compressive**

**Engineering Psychology**  
**Environmental Geology**  
**Environmental Hazards**  
**Environmental Impact**  
*See Also Solid Waste Management*  
**Eolian Geomorphic Features**  
*See Geomorphology*  
**Epeirogenic Movement** — isostasy  
*See Structural Geology*  
**Tectonics**  
**Ephemeral Streams**  
*See Geomorphology*  
**Streams**  
**Epidemiology of Disease**  
*See Public Health*  
**Equity**  
*See Law and Water*  
**Water Rights**  
**Erosion**  
*See Also Geomorphology*  
**Physiography**  
**Erosion Control**  
*See Hydraulics*  
**Erosional Features**  
*See Geomorphology*  
**Shoreline Geomorphology**  
*See Glaciology*  
**Glacial Features**  
**Estuaries**  
**Evaporation Instruments**  
*See Meteorology*  
**Techniques and Instrumentation**  
**Evapotranspiration**  
*See Water Supply*  
**Water Loss**  
**Excavation**  
*See Buildings and Land Development*  
**Construction**  
**Excitation**  
*See Engineering Mechanics*  
**Mechanical Vibrations**  
**Expansive**  
*See Soil Science and Mechanics*  
**Soil Types**  
**Explosive Charges**

ons, Populations	Bunding Fire	Fog — Mist Dissipation
ing Construction	Fire Weather	<i>See Meteorology</i>
conomics	<i>See Meteorology</i>	Weather Modification
	Fiscal Studies	Folds
	<i>See Economics</i>	<i>See Structural Geology</i>
ons, Populations	Income Analysis	Forces and Loadings
	Fish and Wildlife	<i>See Engineering Mechanics</i>
ing Mechanics	Fishing	Forecasting
	<i>See Recreation</i>	<i>See Meteorology</i>
l Geology	Recreation Activities	Forecasting — Prediction
rnment	Flammability	<i>See Techniques and Instrumentation</i>
Water	<i>See Fire Research</i>	Forest Fire
vels	Flood Control Planning	<i>See Fire Research</i>
resources Management	<i>See Water Resources Management</i>	Types of Fire
rams	Flood Control Reservoirs	<i>See Forestry</i>
cs	<i>See Reservoirs and Impoundments</i>	Forest Fires
ysis	Floodplains	<i>See Fire Research</i>
	Floods	Fire Control
uality	Floors	Forest Management
y Control	<i>See Buildings and Land</i>	<i>See Forestry</i>
	Development	Forestry
	Components and Equipment	<i>Dendrochronology</i>
arch	Flow Characteristics	<i>Forest Fire</i>
	<i>See Fluid Dynamics</i>	Fire Behavior
	<i>See Hydraulics</i>	Fire Control
	Flow Routing	Fire Damage, Recovery
	<i>See Techniques and Instrumentation</i>	Fire Prevention
Recovery	Synthetic Hydrology	Fire Use for Silviculture
	Fluid Devices	<i>Forest Management</i>
ent	<i>See Mechanical Power and</i>	<i>Forestry Survey and Mapping</i>
arch	Equipment	Lumbering
	Fluid Dynamics	<i>Policy and Business Methods</i>
arch	<i>Flow Characteristics</i>	Silviculture
	Hydrodynamics	Clear Cutting
	Outfalls	Ecology and Morphology
	Plumes	Forest Environment
ne	Fluid Injection	Forest Litter
arning	<i>See Geophysics</i>	Forest Soils
	Seismology	Physiology, Plant Chemistry
	Fluid Migration	Forestry Survey and Mapping
	<i>See Economic Geology</i>	<i>See Forestry</i>
	Oil and Natural Gas Reservoirs	Formation
		<i>See Stratigraphy</i>
		Fossil Fuels
		<i>See Energy Conversion</i>

**Fossil Invertebrates**  
*See Paleontology*  
**Fossil Organisms**  
**Fossil Plants**  
*See Paleontology*  
**Fossil Organisms**  
**Fossil Vertebrates**  
*See Paleontology*  
**Fossil Organisms**  
**Foundations**  
*See Soil Science and Mechanics*  
**Fracture Mechanics**  
*See Engineering Mechanics*  
**Frames**  
*See Mechanics of Structures*  
**Freeways**  
*See Transportation Engineering*  
**Highway Classification**  
**Freight**  
*See Transportation Engineering*  
**Services**  
**Frequency**  
*See Engineering Mechanics*  
**Mechanical Vibrations**  
**Fresh Water**  
*See Water Types*  
**Fronts**  
*See Meteorology*  
**Atmosphere Disturbance**  
**Frost**  
*See Meteorology*  
**Meteorological Condensation**  
**Frost Heaving**  
*See Soil Science and Mechanics*  
**Physical Properties**  
**Fuels**  
**Futures Research**  
*Long Range Forecasting*  
*Short Range Forecasting*  
**Gaging**  
*See Techniques and Instrumentation*  
**Gases**  
*See Air Pollution*  
**Types of Pollutants**  
**Gates**  
*See Hydraulics*  
**GEOCHEMISTRY**  
*Crust*  
*Trace Element Analysis*

*Geochronology*  
*See Techniques and Instrumentation*  
**Geodetic Surveys**  
*See Geophysics*  
**Geodetic Tiltmeters**  
*See Geophysics*  
**Geophysical Instrumentation**  
**Geologic History**  
*See Stratigraphy*  
**Geologic Maps**  
*See Techniques and Instrumentation*  
**Maps and Surveys**  
**Geologic Sections**  
*See Techniques and Instrumentation*  
**Maps and Surveys**  
**Geological Exploration**  
*See Economic Geology*  
**Geology and Rock Mechanics**  
*See Transportation Engineering*  
**Basic Studies**  
**Geometric Configuration**  
*See Mechanics of Structures*  
**Geomorphology**  
*Engineering Geology*  
**Airfield Sites**  
**Bridge Sites**  
**Dam Sites**  
**Highway Sites**  
**Structure Sites**  
**Tunnel Sites**  
*Eolian Geomorphic Features*  
*Groundwater Features*  
**Caves -- Sink Holes**  
**Karst Topography**  
**Thermal Features**  
*Mass Wasting*  
**Creep**  
**Land and Rock Slides**  
**Mud Flow -- Sheetwash**  
**Slump**  
**Snowslides**  
**Talus -- Scree**  
*Physiography*  
**Erosion**  
**Topography**  
*Shoreline Geomorphology*  
**Barriers**  
**Bars**  
**Beaches**  
**Erosional Features**  
**Sea Cliffs**  
*Streams*  
**Aggradation -- Degradation**  
*Alluvial Fans*

*Epithermal Streams*  
**Stream Control Factors**  
**Stream Cross-section**  
**Stream Gradient**  
**Stream Morphology**  
**Stream Profile**  
**Terraces -- Benches**  
**Valleys -- Canyons**  
*Watershed Morphology*  
**Area**  
**Relief**  
**Shape**  
**Slopes**  
*Weather Processes*  
**Geophysical Analysis**  
*See Techniques and Instrumentation*  
**Geophysics**  
*Electrical Properties*  
**Electric Logging Methods**  
**Electrical Applications**  
**Electromagnetic Probing**  
**Telluric Currents**  
*Geodetic Surveys*  
*Geophysical Instrumentation*  
**Crustal Movement Detectors**  
**Geodetic Instruments**  
**Geodetic Tiltmeters**  
**Geothermal Instruments**  
**Gravimeters**  
**Magnetometers**  
**Seismic Tiltmeters**  
**Seismographs**  
**Seismometers**  
**Strain Gauges**  
*Geothermal Properties*  
**Convection Currents**  
**Geothermal Gradient**  
**Heat Flows**  
**Temperature Logging**  
**Temperature Mapping**  
*Gravity Studies*  
**Gravity Applications**  
**Gravity Mapping**  
**Gravity Surveys**  
*Magnetic Properties*  
**Aeromagnetics**  
**Magnetic Applications**  
**Magnetic Field Characteristics**  
**Magnetic Surveys**  
*Seismology*  
**Acoustics**  
**Aftershocks**  
**Body Waves**  
**Crustal Thickness**  
**Earth Tides**

ake Location  
akes  
njection  
ophysical Seismic Studies  
es  
ng -- Unloading  
eismology  
eisms — Background Noise  
r Blast Detection  
r Blast Effects  
r Devices  
r Explosion  
y Waves  
es  
e Applications  
e Energy  
e Mapping  
e Measurements  
e Motion  
e Reflection  
e Stations and Networks  
e Strain  
e Stress  
e Surveys  
e Travel Time  
e Wave Amplitude  
e Wave Frequency  
e Wave Magnitude  
e Wave Propagation  
e Wave Velocity  
ural Studies  
e Waves  
ismology  
Attenuation  
Dispersion  
Propagation Media  
nclines  
ructural Geology  
nic Features  
ermal  
ergy Conversion  
al Energy Sources  
ology  
l Features  
es  
ditional Features  
nal Features  
sh Plains  
udies  
oustics  
eration  
omposition  
m  
echnical Properties  
ermal Properties

Snow Composition  
Snow Density  
Snow Mechanical Properties  
Snow Metamorphism  
**Global Communication**  
*See Electronic Systems*  
Communication Systems  
**Government**  
*See Social Sciences*  
**Government Expenditures**  
*See Economics*  
Income Analysis  
**Grain Size and Distribution**  
*See Soil Science and Mechanics*  
Physical Properties  
**Granite**  
*See Igneous Rocks*  
**Granular**  
*See Soil Science and Mechanics*  
Soil Types  
**Graphical**  
*See Engineering Mechanics*  
Analysis  
**Grasslands**  
**Gravimeters**  
*See Geophysics*  
Geophysical Instrumentation  
**Gravity Dams**  
*See Hydraulics*  
Dams  
**Gravity Maps**  
*See Techniques and Instrumentation*  
Maps and Surveys  
**Gravity Studies**  
*See Geophysics*  
**Groins**  
*See Hydraulics*  
**Groundwater**  
*See Water Types*  
**Groundwater Movement**  
**Habitat Studies**  
*See Ecology*  
**Hail and Sleet**  
*See Meteorology*  
Meteorological Precipitation  
**Halides**  
*See Minerals*  
**Harbors**  
*See Also Hydraulics*

Equipment  
**Heat and Thermodynamics**  
*Heat Transmission*  
*Thermal Properties*  
*Thermodynamics Relations*  
**Heat Budget**  
*See Meteorology*  
**Heat Flows**  
*See Geophysics*  
Geothermal Properties  
**Heat Transmission**  
*See Heat and Thermodynamics*  
**Helicopters**  
*See Transportation Engineering*  
Transportation Systems  
**High-rise**  
*See Buildings and Land Development*  
Building Classification  
**Highway Classification**  
*See Transportation Engineering*  
**Highway Emergency**  
*See Transportation Engineering*  
Traffic Engineering  
**Highway Structures**  
*See Mechanics of Structures*  
**Hiking**  
*See Recreation*  
Recreation Activities  
**Home Economics**  
*Family Housing Construction*  
*Home Management*  
**Hospital and Medical Facilities**  
*Hospital Personnel and Staffing*  
*Hospital Services and Units*  
Emergency Service  
Outpatient Clinic  
**Hospitals**  
*See Buildings and Land Development*  
Building Classification  
**Housing**  
*See Urban Research*  
**Humidity — Water Vapor**  
*See Meteorology*  
**Hurricanes — Tropical Cyclones**  
*See Meteorology*  
Atmosphere Disturbance  
**Hydraulic Structures**  
*See Mechanics of Structures*

Channels  
Chutes  
Coastal Engineering  
Conduits  
Construction  
Culverts  
Dams  
Arch Dams  
Earth Dams  
Gravity Dams  
Rockfill Dams  
Design  
Dikes  
Discharge  
Annual Discharge  
Daily Discharge  
Seasonal Discharge  
Diversion Channels  
Drainage Structure  
Dredging  
Energy Loss  
Erosion Control  
Flow and Discharge Measurement  
Flow Characteristics  
Flow Types — Natural Water  
Artesian Flow  
Low Flow  
Open Channel Flow  
Peak Flow  
Subsurface Flow  
Surface Flow  
Turbulent Flow  
Unsteady Flow  
Flumes  
Gates  
Groins  
Harbors  
Hydrodynamics  
Jetties  
Levees  
Linings  
Locks  
Model Studies  
Outfalls  
Outlets  
Revetments  
Riprap  
Sea Walls  
Spillways  
Stilling — Settling Basins  
Tidal Action  
Water Velocity

Hydroelectricity  
*See Energy Conversion*  
Natural Energy Sources  
Hydrographs  
*See Techniques and Instrumentation*  
Synthetic Hydrology  
Hydrology  
Hydrostatic  
*See Soil Science and Mechanics*  
Pressure  
Hysteresis  
*See Engineering Mechanics*  
Ice Crystals  
*See Meteorology*  
Meteorological Condensation  
Ice Jam  
*See Glaciology*  
Ice Studies  
Ice Studies  
*See Glaciology*  
Igneous Activity — Volcanism  
*See Structural Geology*  
Tectonics  
Igneous Rocks  
Andesite  
Basalt  
Crystalline Rocks  
Granite  
Intrusive Rocks  
Lava  
Magma  
Rhyolite  
Tuff  
Volcanic Rocks  
Ignition  
*See Fire Research*  
Imaging  
*See Techniques and Instrumentation*  
Optical Instrumentation  
Impact and Shock  
*See Engineering Mechanics*  
Forces and Loadings  
Impact of Land Use  
*See Buildings and Land Development*  
Land Use and Development

Economics  
Income Analysis  
Indexes  
*See Publications*  
Indigenous Workers  
*See Occupations, Populations*  
Industrial Engineering  
Industrial Pollution  
*See Air Pollution*  
Industrial Sector  
*See Economics*  
Industrial Structures  
*See Mechanics of Structures*  
Industrial Wastes  
*See Waste Water Treatment/Disposal*  
*See Water Quality*  
Pollution Sources  
Information Centers  
Information Services  
Information Systems Research  
*Communication Theory*  
*Control Theory*  
Control Systems  
Sensitivity Techniques  
*Data Reduction and Analysis*  
*Economic Theory*  
Cost Analysis  
Design of Experiments  
Management Science  
Optimization Technique  
Programming  
Systems Analysis  
*Mathematical Models*  
Development of Models  
Modification of Models  
Prediction Models  
Statistical Models  
Stochastic Models  
Testing of Models  
Infrared Systems  
*See Electronic Systems*  
Sensing Systems  
Infrared Techniques  
*See Techniques and Instrumentation*

ment  
 ional  
 y and Water  
 ive Levels  
 ional Programs  
 tions  
 nsportation Engineering  
 te  
 nsportation Engineering  
 y Classification  
 ial Water  
 imentology  
 at Properties  
 al — Littoral Areas  
 e Rocks  
 ous Rocks  
 n  
 eorology  
 ent and Savings  
 nomics  
 Analysis  
 l Gases in Water  
 er Quality  
 Properties  
 n  
 res  
 ctural Geology  
 : Features  
 , Social and Perceptual  
 ss — Behavioral Aspects  
 nm  
 eorology  
 raedics  
 hysics of Structures  
 - Fractures  
 ctural Geology  
 opography  
 morphology  
 water Features  
 — Marker Bed  
 tigraphy

Lake Deposits  
*See Sedimentology*  
 Sedimentary Deposits  
 Lakes  
 Land — Sea Breezes  
*See Meteorology*  
 Wind  
 Land and Rock Slides  
*See Geomorphology*  
 Mass Wasting  
 Land Forming  
*See Techniques and Instrumentation*  
 Land Use  
*See Urban Research*  
*See Water Resources Management*  
 Land Use and Development  
*See Buildings and Land Development*  
*See Economics*  
 Landslides  
*See Soil Science and Mechanics*  
 Lasers — Masers  
*See Techniques and Instrumentation*  
 Remote Sensing  
 Lava  
*See Igneous Rocks*  
 Law and Water  
 Law Enforcement  
 Legislation — Zoning  
 Legislative Levels  
 Federal Government  
 International  
 Local Government  
 State Government  
 Water Law  
 Water Rights  
 Easements — Right of Way  
 Equity  
 Law and Legal Procedures  
*See Social Sciences*  
 Layered System  
*See Soil Science and Mechanics*  
 Soil Types  
 Legislation — Zoning  
*See Law and Water*  
 Legislative Processes  
*See Social Sciences*  
 Government

Level Flight  
*See Aeronautics and Aerodynamics*  
 Aircraft Flights  
 Leveling  
*See Techniques and Instrumentation*  
 Surveying Methods  
 Lightning  
*See Meteorology*  
 Linear  
*See Engineering Mechanics*  
 Mechanical Vibrations  
 Linings  
*See Hydraulics*  
 Liquefaction  
*See Soil Science and Mechanics*  
 Lithification  
*See Sedimentology*  
 Lithology  
*See Stratigraphy*  
 Live Load  
*See Engineering Mechanics*  
 Forces and Loadings  
 Load Tests  
*See Soil Science and Mechanics*  
 Techniques and Instrumentation  
 Local Government  
*See Law and Water*  
 Legislative Levels  
 Location  
*See Transportation Engineering*  
 Design  
 Locks  
*See Hydraulics*  
 Loess  
*See Sedimentology*  
 Sedimentary Deposits  
 Long Range Forecasting  
*See Futures Research*  
 Low Cost Housing  
*See Buildings and Land Development*  
 Building Classification  
 Low Flow  
*See Hydraulics*  
 Flow Types — Natural Water  
 Lumbering  
*See Forestry*



*See Igneous Rocks*  
**Magnetic Studies**  
*See Oceanography*  
 Geophysical Oceanography  
**Magnetic Surveys**  
*See Geophysics*  
 Magnetic Properties  
**Magnetometers**  
*See Geophysics*  
 Geophysical Instrumentation  
**Maintenance**  
*See Buildings and Land Development*  
*See Transportation Engineering*  
**Management**  
*See Economics*  
 Production and Processing  
*See Water Resources Management*  
**Management and Administration**  
*See Social Sciences*  
**Management and Planning**  
*See Solid Waste Management*  
**Management Science**  
*See Information Systems Research*  
 Economic Theory  
**Manpower**  
*See Social Sciences*  
**Mantle**  
*See Structural Geology*  
 Tectonic Features  
**Manufacturing**  
*See Buildings and Land Development*  
 Building Classification  
**Maps and Surveys**  
*See Techniques and Instrumentation*  
**Marinas**  
**Marine Biology**  
*Marine Animals*  
*Marine Plants*  
**Marine Geology**  
*See Oceanography*  
**Marine Navigation Systems**  
*See Electronic Systems*  
**Marine Pollution**  
*See Oceanography*

**Mass Wasting**  
*See Geomorphology*  
**Mathematical Analysis**  
*See Techniques and Instrumentation*  
**Mathematical Models**  
*See Information Systems Research*  
*See Techniques and Instrumentation*  
 Model Studies  
**Measurements and Measuring**  
*See Techniques and Instrumentation*  
**Measuring Devices**  
*See Techniques and Instrumentation*  
 Measurements and Measuring  
**Mechanical Power and Equipment**  
 Control Devices  
 Energy Dissipators  
 Valves  
 Fluid Devices  
 Heat and Cooling Devices  
 Nuclear Power  
 Power Plants  
 Pumps  
**Mechanical Properties**  
*See Soil Science and Mechanics*  
**Mechanical Shock**  
*See Engineering Mechanics*  
 Stresses  
**Mechanical Vibrations**  
*See Engineering Mechanics*  
**Mechanics of Structures**  
 Bars  
 Beams  
 Cantilevers  
 Columns  
 Composite Structures  
 Concrete Structures  
 Mass  
 Reinforced  
 Frames  
 Geometric Configuration  
 Circular  
 Cylindrical  
 Highway Structures  
 Hydraulic Structures  
 Industrial Structures  
 Joints  
 Model Studies  
 Panels  
 Plates

**Structural Testing**  
*Support Structures*  
 Trusses  
 Wood Structures  
**Medical Services**  
**Mesometeorology**  
*See Meteorology*  
**Metallic Ores**  
*See Economic Geology*  
**Metamorphic Rocks**  
**Meteoric Water**  
*See Water Types*  
**Meteorology**  
 Advection  
 Air Mass  
 Air Patterns and Circulation  
 Air Pressure -- Density  
 Air Temperature  
 Air Turbulence  
 Atmosphere Disturbance  
 Cyclones -- Anticyclones  
 Fronts  
 Hurricanes -- Tropical Cyclones  
 Monsoons  
 Severe Storms  
 Storms and Squalls  
 Thunderstorms  
 Tornadoes - - Waterspouts  
 Atmospheric Energy  
 Atmospheric Radiation  
 Boundary Layer Studies  
 Climatology  
 Applied Climatology  
 Climatography  
 Physical Climatology  
 Clouds  
 Cloud Ceiling  
 Cloud Classification  
 Cloud Cover  
 Cloud Motions -- Movement  
 Cloud Patterns  
 Cloud Physics  
 Cloud Structure  
 Convection  
 Drought  
 Fire Weather  
 Forecasting  
 Gravity Waves  
 Heat Budget

Construction	<b>Metropolitan Areas</b>	<b>Models</b>
<i>Meteorology</i>	<b>Microbiology</b>	<i>See Buildings and Land Development</i>
<i>Meteorology</i>	<i>See Soil Science and Mechanics</i>	<i>See Transportation Engineering Basic Studies</i>
<i>Metamorphological Condensation</i>	<b>Micrometeorology</b>	<b>Moments</b>
<i>Atmospheric Physics</i>	<i>See Meteorology</i>	<i>See Engineering Mechanics</i>
<i>Maze - Mist</i>	<b>Microseismology</b>	<b>Monitoring</b>
<i>Materials</i>	<i>See Geophysics</i>	<i>See Techniques and Instrumentation</i>
<i>Metamorphological Extremes</i>	<i>Seismology</i>	<b>Monographs</b>
<i>Metamorphological Precipitation</i>	<b>Microseisms — Background Noise</b>	<i>See Publications</i>
<i>Sleet</i>	<i>See Geophysics</i>	<b>Monsoons</b>
<i>Motion</i>	<i>Seismology</i>	<i>See Meteorology</i>
<i>Meteorology</i>	<b>Microwave Radiation</b>	<i>Atmosphere Disturbance</i>
<i>Studies</i>	<i>See Techniques and Instrumentation</i>	<b>Mountains</b>
<i>Studies</i>	<i>Remote Sensing</i>	<b>Mud Flow — Sheetwash</b>
<i>Weather Observations</i>	<b>Microwave Techniques</b>	<i>See Geomorphology</i>
<i>Techniques and Instrumentation</i>	<i>See Electronic Systems</i>	<i>Mass Wasting</i>
<i>Radio Stations --- Networks</i>	<b>Military Personnel</b>	<b>Multiple Purpose Projects</b>
<i>Recording Instruments</i>	<i>See Occupations, Populations</i>	<i>See Water Resources Management</i>
<i>Recording Instruments</i>	<b>Mine Engineering</b>	<b>Multiple Purpose Reservoirs</b>
<i>Recording Instruments</i>	<i>See Economic Geology</i>	<i>See Reservoirs and Impoundments</i>
<i>Recording Instruments</i>	<i>Mining Studies</i>	<b>National and Civil Defense</b>
<i>Recording Instruments</i>	<b>Mineralogical Composition</b>	<i>Civil Defense</i>
<i>Recording Instruments</i>	<i>See Sedimentology</i>	<i>Nuclear Warfare</i>
<i>Recording Instruments</i>	<i>Sediment Properties</i>	<b>National Income</b>
<i>Recording Instruments</i>	<b>Minerals</b>	<i>See Economics</i>
<i>Recording Instruments</i>	<i>Clay Minerals</i>	<i>Income Analysis</i>
<i>Recording Instruments</i>	<i>Halides</i>	<b>Natural Energy Sources</b>
<i>Recording Instruments</i>	<b>Mining</b>	<i>See Energy Conversion</i>
<i>Recording Instruments</i>	<i>See Buildings and Land Development</i>	<b>Natural Gas</b>
<i>Recording Instruments</i>	<i>Building Classification</i>	<i>See Economic Geology</i>
<i>Recording Instruments</i>	<b>Mining Activities</b>	<i>Non-metallic Deposits</i>
<i>Recording Instruments</i>	<i>See Water Quality</i>	<b>Navigation</b>
<i>Recording Instruments</i>	<i>Pollution Sources</i>	<i>See Oceanography</i>
<i>Recording Instruments</i>	<b>Mining Studies</b>	<i>Ocean Engineering Studies</i>
<i>Recording Instruments</i>	<i>See Economic Geology</i>	<b>Niches</b>
<i>Recording Instruments</i>	<b>Mobile Homes</b>	<i>See Ecology</i>
<i>Recording Instruments</i>	<i>See Buildings and Land Development</i>	<b>Non-clastic Sediments</b>
<i>Recording Instruments</i>	<i>Building Classification</i>	<i>See Sedimentology</i>
<i>Recording Instruments</i>	<b>Mobility</b>	<i>Sedimentary Rocks</i>
<i>Recording Instruments</i>	<i>See Social Sciences</i>	<b>Non-metallic Deposits</b>
<i>Recording Instruments</i>	<b>Model Cities</b>	<i>See Economic Geology</i>
<i>Recording Instruments</i>	<b>Model Studies</b>	<b>Nuclear Blast Effects</b>
<i>Recording Instruments</i>	<i>See Hydraulics</i>	<i>See Geophysics</i>
<i>Recording Instruments</i>	<i>See Mechanics of Structures</i>	<i>Seismology</i>
<i>Recording Instruments</i>	<i>See Meteorology</i>	<i>See Meteorology</i>
<i>Recording Instruments</i>		<i>Weather Modification</i>

ar Reactors  
or Safety  
or Suing  
ar Warfare  
ational and Civil Defense  
ation Physics  
eteorology  
er Modification  
nts  
ater Quality  
ion Sources  
vation Wells  
echniques and Instrumentation  
ations, Populations  
ement Personnel  
es  
ers  
ous Workers  
l Status  
ry Personnel  
edical Personnel  
ians  
Workers  
Basin Structure  
ructural Geology  
ic Features  
Circulation  
eanography  
ater Motion  
Coring and Dredging  
eanography  
ographic Techniques  
Currents  
eanography  
ater Motion  
Dumping  
eanography  
e Pollution  
Energy  
eanography  
ater Motion  
Engineering Studies  
eanography  
Hydrodynamics  
eanography  
ater Motion  
Meteorological Studies  
eanography  
Mixing  
eanography

cean Sediments  
*See Oceanography*  
Marine Geology  
Ocean Subsurface Environment  
Ocean Surface Environment  
Oceanographic Instrumentation  
*See Oceanography*  
Oceanographic Techniques  
*See Oceanography*  
Oceanography  
*Air - - Sea Boundary Studies*  
Heat and Radiation Transfer  
Particle - Gas Transfer  
Wind - Water Interaction  
*Biological Oceanography*  
*Geophysical Oceanography*  
Heat Flow Measurements  
Magnetic Studies  
Seismic Studies  
*Marine Geology*  
Bottom Topography  
Continental Shelves  
Continental Slopes  
Ocean Sediments  
Stratigraphy  
Sub-bottom Structure  
Submarine Canyons  
Submarine Faults  
Turbidity Currents  
*Marine Pollution*  
Ocean Dumping  
Petroleum Wastes - Spillage  
*Ocean Engineering Studies*  
Navigation  
Shoreline Structures  
*Ocean Meteorological Studies*  
*Ocean Mining*  
*Oceanographic Instrumentation*  
Bathythermographs  
Bottom Sampling Devices  
Buoys  
Deep Submersibles  
Physical Instruments  
Platforms  
Sonar  
Water Motion Recorders  
*Oceanographic Techniques*  
Bathymetry  
Ocean Coring and Dredging  
Profiles  
Sea Water Sampling  
Ships and Cruises  
Tracers  
*Offshore Oil*  
*Sea Water Chemistry*

Sea Water Analysis  
*Sea Water Motion*  
Ocean Circulation  
Ocean Currents  
Ocean Energy  
Ocean Hydrodynamics  
Ocean Mixing  
Sea Level Variations  
Storm Surge  
Tides  
Tsunamis  
Turbulence  
Waves  
*Sea Water Properties*  
Depth  
Thermal Properties  
Offshore Oil  
*See Oceanography*  
Oil  
*See Economic Geology*  
Non-metallic Deposits  
Oil and Natural Gas Reservoirs  
*See Economic Geology*  
Open Channel Flow  
*See Hydraulics*  
Flow Types - Natural Water  
Optical Instrumentation  
*See Techniques and Instrumentation*  
Optical Instruments  
*See Meteorology*  
Techniques and Instrumentation  
Optimization and Feasibility  
*See Economics*  
Production and Processing  
Optimization Technique  
*See Information Systems Research*  
Economic Theory  
Organic  
*See Water Quality*  
Water Properties  
Organic Compounds  
*See Air Pollution*  
Types of Pollutants  
Organization Studies  
*See Social Sciences*  
Orographic Effects  
*See Meteorology*  
Wind  
Outfalls  
*See Fluid Dynamics*  
*See Hydraulics*

- den
- mentology
- ary Deposits
- logy
- rganisms
- vertebrates
- ants
- ertebrates
- hysics of Structures
- ical Personnel
- ppations, Populations
- sportation Engineering
- s
- ation
- Gas Transfer
- nography
- ra Boundary Studies
- tes
- Pollution
- Pollutants
- r
- sportation Engineering
- w
- aulics
- es — Natural Water
- eter
- Science and Mechanics
- es and Instrumentation
- neering Mechanics
- d Loadings
- ls, Journals
- cations
- st — Frozen Soils
- Science and Mechanics
- s
- lity
- mentology
- Properties
- Science and Mechanics
- Properties
- es and Instrumentation
- Petrography**  
*See Techniques and Instrumentation*
- Petroleum Wastes**  
*See Water Quality*  
Pollution Sources
- Petroleum Wastes — Spillage**  
*See Oceanography*  
Marine Pollution
- Photographic Instruments**  
*See Techniques and Instrumentation*  
Optical Instrumentation
- Photography**  
*See Meteorology*  
Techniques and Instrumentation
- Physical Climatology**  
*See Meteorology*  
Climatology
- Physical Models**  
*See Techniques and Instrumentation*  
Model Studies
- Physical Properties**  
*See Soil Science and Mechanics*
- Physicians**  
*See Occupations, Populations*
- Physiographic History**  
*See Stratigraphy*  
Geologic History
- Physiography**  
*See Geomorphology*
- Physiology, Plant Chemistry**  
*See Forestry*  
Silviculture
- Piezometers**  
*See Soil Science and Mechanics*  
Techniques and Instrumentation
- Piezometry**  
*See Techniques and Instrumentation*
- Pillow Lava**  
*See Volcanics*
- Pipelines**  
*See Transportation Engineering*  
Transportation Systems
- Piping Systems**  
*See Buildings and Land Development*  
Components and Equipment
- See Water Resources Management*
- Plant Pollutants**  
*See Water Quality*  
Pollution Sources
- Plastic**  
*See Engineering Mechanics*  
Analysis  
Strain
- Plate or Block Tectonics**  
*See Structural Geology*  
Tectonics
- Plates**  
*See Mechanics of Structures*
- Platforms**  
*See Oceanography*  
Oceanographic Instrumentation
- Plumes**  
*See Fluid Dynamics*
- Police**  
*See Occupations, Populations*
- Policy Making**  
*See Social Sciences*  
Government
- Pollutant Identification**  
*See Water Quality*
- Pollution Abatement**  
*See Water Quality*  
Water Quality Control
- Pollution Effects**  
*See Water Quality*
- Pollution Sources**  
*See Water Quality*
- Population Distribution**  
*See Ecology*
- Population Dynamics**  
*See Ecology*
- Pore Water**  
*See Soil Science and Mechanics*  
Pressure
- Porosity**  
*See Sedimentology*  
Sediment Properties
- Ports and Harbors**  
*See Transportation Engineering*  
Terminals

**Power Plants**  
*See Mechanical Power and Equipment*

**Power Reservoirs**  
*See Reservoirs and Impoundments*

**Pre-impoundment Sites**

**Precipitation**  
*See Meteorology*  
Meteorological Precipitation

**Prediction Models**  
*See Information Systems Research*  
Mathematical Models

**Prefabricated Structures**  
*See Mechanics of Structures*

**Pressure**  
*See Soil Science and Mechanics*  
*See Techniques and Instrumentation*  
Measurements and Measuring

**Primary Waves**  
*See Geophysics*  
Seismology

**Production and Processing**  
*See Economics*

**Profiles**  
*See Oceanography*  
Oceanographic Techniques

**Programming**  
*See Information Systems Research*  
Economic Theory

**Project Post-evaluation**  
*See Water Resources Management*

**Projections and Estimations**  
*See Water Resources Management*

**Projections and Forecasts**  
*See Economics*

**Public Health**  
Community Health Services  
Administration and Planning  
Community Mental Health Center  
Emergency Non-hospital Service  
Information and Referral Service  
Personnel  
Regional Centers  
*Epidemiology of Disease*

**Public Income Planning**  
*See Economics*  
Income Analysis

*See Reservoirs and Impoundments*

**Public Works**  
*See Urban Research*

**Publications**  
*Bibliography*  
*Catalogs, Tables, Compilations*  
*Handbooks*  
*Indexes*  
*Monographs*  
*Periodicals, Journals*

**Pulp, Paper, and Logging**

**Pumping**  
*See Techniques and Instrumentation*

**Pumps**  
*See Mechanical Power and Equipment*

**Q Waves**  
*See Geophysics*  
Seismology

**Quality Control**  
*See Transportation Engineering*

**Radar**  
*See Meteorology*  
Techniques and Instrumentation  
*See Techniques and Instrumentation*

**Remote Sensing**

**Radiation Emission**  
*See Soil Science and Mechanics*  
Physical Properties

**Radio Communication**  
*See Electronic Systems*  
Communication Systems

**Radio Detection Systems**  
*See Electronic Systems*  
Sensing Systems

**Radioactive Fallout**  
*See Water Quality*  
Pollution Sources

**Radioactive Waste**

**Radioactivity**  
*See Air Pollution*  
Types of Pollutants

**Radiosondes — Rawinsondes**  
*See Meteorology*  
Techniques and Instrumentation

*Techniques and Instrumentation*

**Random**  
*See Engineering Mechanics*  
Forces and Loadings

**Rate of Deposition**  
*See Sedimentology*  
Sedimentary Deposits

**Reactor Safety**  
*See Nuclear Reactors*

**Reactor Siting**  
*See Nuclear Reactors*

**Real Estate Sector**  
*See Economics*

**Reconnaissance Maps**  
*See Techniques and Instrumentation*  
Maps and Surveys

**Reconnaissance Surveying**  
*See Techniques and Instrumentation*  
Surveying Methods

**Recovery — Production**  
*See Economic Geology*  
Oil and Natural Gas Reservoirs

**Recreation**  
*Access to Recreation*  
*Damage Losses*  
*Demand and Use*  
*Laws and Regulations*  
*Parks*  
*Recreation Activities*  
Bicycling  
Boating  
Camping  
Fishing  
Hiking  
Touring  
*Recreation Facilities*  
Safety

**Recreational**  
*See Buildings and Land Development*  
Building Classification

**Regional Centers**  
*See Public Health*  
Community Health Services

**Regional Economics**  
*See Economics*

by Legislation  
conomics  
Analysis  
ation  
ed  
chanics of Structures  
Structures  
morphology  
d Morphology  
ul Sciences  
Control Systems  
ronic Systems  
Sensing  
niques and Instrumentation  
Sensing Systems  
ronic Systems  
Systems  
Maintenance  
Operations  
nautics and Aerodynamics  
s  
Science and Mechanics  
structures  
s and Impoundments  
ontrol Reservoirs  
n Reservoirs  
Purpose Reservoirs  
eservoirs  
ater Supply Reservoirs  
al  
lings and Land  
ment  
Classification  
Inventories  
omic Geology  
Appraisals  
eering Mechanics  
al Vibrations  
ector  
omics  
g Walls  
Science and Mechanics  
structures

*See Hydraulics*  
**Rhyolite**  
*See Igneous Rocks*  
**Rifts**  
*See Structural Geology*  
Faults  
**Rime**  
*See Meteorology*  
Meteorological Condensation  
**Riparian Land**  
**Riprap**  
*See Hydraulics*  
**Risk and Entrepreneur Decisions**  
*See Economics*  
Production and Processing  
**River Basins**  
**Road Obstacles**  
*See Transportation Engineering*  
Traffic Engineering  
**Roadway**  
*See Transportation Engineering*  
**Rock Mechanics**  
*See Structural Geology*  
**Rockfill Dams**  
*See Hydraulics*  
Dams  
**Roofs**  
*See Buildings and Land Development*  
Components and Equipment  
**Rural Areas**  
**Safety**  
*See Buildings and Land Development*  
*See Recreation*  
*See Transportation Engineering*  
Traffic Engineering  
**Safety Engineering**  
**Saline Water Intrusion**  
*See Water Quality*  
Pollution Sources  
**Salinity**  
*See Oceanography*  
Sea Water Chemistry  
*See Water Quality*  
Water Properties

*See Structural Geology*  
Tectonic Features  
**Salt Marshes**  
**Sampling**  
*See Techniques and Instrumentation*  
**Sand**  
*See Soil Science and Mechanics*  
Soil Types  
**Sands and Gravels**  
*See Economic Geology*  
Non-metallic Deposits  
**Sanitary Landfills**  
*See Water Quality*  
Pollution Sources  
**Satellite Communication**  
*See Electronic Systems*  
Communication Systems  
**Satellites**  
*See Meteorology*  
Techniques and Instrumentation  
*See Techniques and Instrumentation*  
Remote Sensing  
**Saturated**  
*See Soil Science and Mechanics*  
Soil Types  
**Scarps**  
*See Structural Geology*  
**Sea Cliffs**  
*See Geomorphology*  
Shoreline Geomorphology  
**Sea Floor Spreading**  
*See Structural Geology*  
Tectonics  
**Sea Level Variations**  
*See Oceanography*  
Sea Water Motion  
**Sea Walls**  
*See Hydraulics*  
**Sea Water Analysis**  
*See Oceanography*  
Sea Water Chemistry  
**Sea Water Motion**  
*See Oceanography*  
**Seasonal Discharge**  
*See Hydraulics*  
Discharge

- Sediment Properties**  
*See Sedimentology*
- Sedimentary History**  
*See Stratigraphy*
- Geologic History**
- Sedimentary Rocks**  
*See Sedimentology*
- Sedimentology**  
*Diagenesis*  
*Lithification*  
*Sediment Deposition*  
*Sediment Properties*  
*Interstitial Water*  
*Mineralogical Composition*  
*Permeability*  
*Porosity*  
*Sediment Size*  
*Sediment Provenance Studies*  
*Sediment Transport*  
*Transport Agents*  
*Transport Effects*  
*Transport Methods*  
*Sedimentary Deposits*  
*Alluvial Deposits*  
*Lake Deposits*  
*Loess*  
*Overburden*  
*Rate of Deposition*  
*Sediment Thickness*  
*Unconsolidated Deposits*  
*Sedimentary Rocks*  
*Glacial Clastics*  
*Non-clastic Sediments*  
*Tectogenic Clastics*  
*Water Deposited Clastics*
- Sediments**  
*See Water Quality*  
*Pollution Sources*
- Seepage**  
*See Also Soil Science and Mechanics*
- Seiches**
- Seismic Applications**  
*See Geophysics*  
*Seismology*
- Seismic Energy**  
*See Geophysics*  
*Seismology*
- Seismic Mapping**  
*See Geophysics*  
*Seismology*
- Seismology**  
*See Geophysics*
- Seismic Reflection**  
*See Geophysics*  
*Seismology*
- Seismic Stations and Networks**  
*See Geophysics*  
*Seismology*
- Seismic Strain**  
*See Geophysics*  
*Seismology*
- Seismic Stress**  
*See Geophysics*  
*Seismology*
- Seismic Studies**  
*See Oceanography*  
*Geophysical Oceanography*
- Seismic Surveys**  
*See Geophysics*  
*Seismology*
- Seismic Tiltmeters**  
*See Geophysics*  
*Geophysical Instrumentation*
- Seismic Travel Time**  
*See Geophysics*  
*Seismology*
- Seismic Wave Amplitude**  
*See Geophysics*  
*Seismology*
- Seismic Wave Frequency**  
*See Geophysics*  
*Seismology*
- Seismic Wave Magnitude**  
*See Geophysics*  
*Seismology*
- Seismic Wave Propagation**  
*See Geophysics*  
*Seismology*
- Seismic Wave Velocity**  
*See Geophysics*  
*Seismology*
- Seismographs**  
*See Geophysics*  
*Geophysical Instrumentation*  
*Seismology*  
*See Geophysics*
- Sensing Systems**  
*See Electronic Systems*
- Sensitivity Techniques**  
*See Information Systems Research*  
*Control Theory*
- Septic Tanks**  
*See Waste Water Treatment/Disposal*
- Sewage System**
- Settlement**  
*See Soil Science and Mechanics*
- Severe Storms**  
*See Meteorology*  
*Atmosphere Disturbance*
- Sewage**  
*See Water Quality*  
*Pollution Sources*
- Sewage System**  
*See Waste Water Treatment/Disposal*
- Shale**  
*See Soil Science and Mechanics*
- Soil Types**
- Shapes**  
*See Geomorphology*  
*Watershed Morphology*
- Shear**  
*See Engineering Mechanics*  
*Strain*
- Shear Strength**  
*See Soil Science and Mechanics*  
*Mechanical Properties*  
*See Structural Geology*  
*Rock Mechanics*
- Shells**  
*See Mechanics of Structures*
- Ships and Cruises**  
*See Oceanography*  
*Oceanographic Techniques*
- Shoals**
- Shock Waves**  
*See Acoustics*
- Shoreline Geomorphology**  
*See Geomorphology*

<b>Snowpack</b>	<b>Snowslides</b>	<b>Slopes</b>
<i>See Geomorphology</i>	<i>See Geomorphology</i>	<i>Erosion and Erosion Control</i>
<b>Electronic Systems</b>	<b>Mass Wasting</b>	<i>Foundations</i>
<b>Science and Mechanics</b>	<b>Social Aspects</b>	<i>Landslides</i>
<b>es</b>	<i>See Water Resources Management</i>	<i>Liquefaction</i>
<b>re</b>	<b>Social Environment</b>	<i>Mechanical Properties</i>
<i>stry</i>	<i>See Urban Research</i>	<i>Cohesion</i>
<b>n</b>	<b>Social Sciences</b>	<i>Compressive Strength</i>
<i>omics</i>	<i>Community Studies</i>	<i>Creep and Rheology</i>
<b>Techniques and Instrumentation</b>	<i>Criminology</i>	<i>Deformation</i>
<b>tion Factors</b>	<i>Demography</i>	<i>Elasticity</i>
<i>omics</i>	<i>Government</i>	<i>Shear Strength</i>
<b>ings and Land</b>	<i>Intergovernmental Relations</i>	<i>Microbiology</i>
<b>ment</b>	<i>Legislative Processes</i>	<i>Nutrients/ Fertilizers</i>
<b>ion</b>	<i>Policy Making</i>	<i>Physical Properties</i>
<b>omics of Structures</b>	<i>Law and Legal Procedures</i>	<i>Density</i>
<b>utilization</b>	<i>Leisure and Recreation</i>	<i>Frost Heaving</i>
<i>Techniques and Instrumentation</i>	<i>Management and Administration</i>	<i>Grain Shape</i>
<b>ning</b>	<i>Manpower</i>	<i>Grain Size and Distribution</i>
<b>orphology</b>	<i>Medical</i>	<i>Permeability</i>
<b>Morphology</b>	<i>Mobility</i>	<i>Radiation Emission</i>
<i>Science and Mechanics</i>	<i>Organization Studies</i>	<i>Swelling — Shrinking</i>
<b>ctures</b>	<i>Religion</i>	<i>Temperature</i>
<b>orphology</b>	<i>Social Structure</i>	<i>Void Ratio and Porosity</i>
<b>ing</b>	<b>Social Structure</b>	<i>Water Content</i>
<b>ersheds</b>	<i>See Social Sciences</i>	<i>Pressure</i>
<b>sheds</b>	<b>Social Workers</b>	<i>Hydrostatic</i>
<b>research</b>	<i>See Occupations, Populations</i>	<i>Pore Water</i>
<b>ol</b>	<b>Soil Cement</b>	<i>Uplift</i>
<b>Soot</b>	<i>See Soil Science and Mechanics</i>	<i>Seepage</i>
<b>llution</b>	<b>Soil Types</b>	<i>Settlement</i>
<b>ollutants</b>	<b>Soil Dynamics</b>	<i>Soil Dynamics</i>
<b>ology</b>	<i>See Soil Science and Mechanics</i>	<i>Soil Pollution</i>
<b>ical Precipitation</b>	<b>Soil Leaching</b>	<i>Soil Surveys</i>
<b>osition</b>	<b>Soil Maps</b>	<i>Soil Types</i>
<b>ogy</b>	<i>See Techniques and Instrumentation</i>	<i>Aggregate</i>
<b>es</b>	<b>Maps and Surveys</b>	<i>Clay</i>
<b>es</b>	<b>Soil Pollution</b>	<i>Cohesive</i>
<b>ogy</b>	<i>See Soil Science and Mechanics</i>	<i>Consolidated</i>
	<b>Soil Science and Mechanics</b>	<i>Disturbed -- Undisturbed</i>
	<i>Backfills</i>	<i>Expansive</i>
	<i>Bearing Capacity</i>	<i>Glacial</i>
	<i>Buried Structures</i>	<i>Granular</i>
	<i>Chemical Properties</i>	<i>Layered System</i>
	<i>Conservation</i>	<i>Permafrost — Frozen Soils</i>
	<i>Cover Crops</i>	<i>Sand</i>
	<i>Drainage</i>	<i>Saturated</i>
	<i>Earth Structures</i>	<i>Shale</i>
		<i>Silt</i>
		<i>Soil Cement</i>
		<i>Soil-Structure Interaction</i>
		<i>Stability Analysis</i>
		<i>Stresses</i>



**Load Tests**  
**Model Studies**  
**Penetrometer**  
**Permeability**  
**Piezometers**  
**Stabilization**  
**Triaxial Test**  
**Vane Test**  
**Water Content Test**  
  
**Soil Surveys**  
*See Soil Science and Mechanics*  
**Soil Types**  
*See Soil Science and Mechanics*  
**Soil-Structure Interaction**  
*See Soil Science and Mechanics*  
  
**Solar Energy**  
*See Energy Conversion*  
**Natural Energy Sources**  
  
**Solid Waste Management**  
*Disposal*  
*Environmental Impact*  
*Management and Planning*  
*Waste Type*  
  
**Sonar**  
*See Oceanography*  
**Oceanographic Instrumentation**  
  
**Space Communication**  
*See Electronic Systems*  
**Communication Systems**  
  
**Spectral Reflectance**  
*See Techniques and Instrumentation*  
**Remote Sensing**  
  
**Spillways**  
*See Hydraulics*  
  
**Stability**  
*See Engineering Mechanics*  
  
**Stability Analysis**  
*See Soil Science and Mechanics*  
  
**Stabilization**  
*See Soil Science and Mechanics*  
**Techniques and Instrumentation**  
  
**Standards and Criteria**  
*See Transportation Engineering*  
**Design**  
  
**State — Local Governments**  
*See Water Resources Management*

**Forces and Loadings**  
**Statistical Models**  
*See Information Systems Research*  
**Mathematical Models**  
  
**Steel Structures**  
*See Mechanics of Structures*  
  
**Stiffness and Flex**  
*See Engineering Mechanics*  
**Mechanical Vibrations**  
  
**Stilling — Settling Basins**  
*See Hydraulics*  
  
**Stochastic Models**  
*See Information Systems Research*  
**Mathematical Models**  
  
**Storage and Retention**  
*See Waste Water*  
*Treatment/Disposal*  
**Sewage System**  
  
**Storm Modification**  
*See Meteorology*  
**Weather Modification**  
  
**Storm Runoff**  
*See Water Runoff*  
  
**Storm Sewers**  
*See Waste Water*  
*Treatment/Disposal*  
**Sewage System**  
  
**Storm Surge**  
*See Oceanography*  
**Sea Water Motion**  
  
**Storms and Squalls**  
*See Meteorology*  
**Atmosphere Disturbance**  
  
**Strain**  
*See Engineering Mechanics*  
  
**Strain Gauges**  
*See Engineering Mechanics*  
**Analysis**  
*See Geophysics*  
**Geophysical Instrumentation**  
  
**Stratigraphy**  
*See Also Oceanography*  
**Marine Geology**  
**Correlation**  
**Formation**  
**Geologic History**

**Local Stratigraphy**  
**Stratigraphic Facies**  
**Stratigraphic Sequence**  
**Subsurface Stratigraphy**  
**Volcanic Stratigraphy**  
  
**Stream Banks**  
  
**Stream Control Factors**  
*See Geomorphology*  
**Streams**  
  
**Stream Gradient**  
*See Geomorphology*  
**Streams**  
  
**Stream Scour**  
  
**Stream Sediment Yield**  
  
**Streams**  
*See Also Geomorphology*  
  
**Strength**  
*See Engineering Mechanics*  
  
**Stress — Behavioral Aspects**  
*Disaster*  
*Isolation, Social and Perceptual*  
  
**Stresses**  
*See Engineering Mechanics*  
*See Soil Science and Mechanics*  
  
**Structural**  
*See Buildings and Land*  
*Development*  
**Design**  
*See Transportation Engineering*  
**Design**  
  
**Structural Analysis**  
*See Mechanics of Structures*  
*See Structural Geology*  
  
**Structural Design**  
*See Mechanics of Structures*  
  
**Structural Geology**  
**Fault Complexes**  
**Faults**  
**Rifts**  
**Thrust Faults**  
**Transform Faults**  
**Folds**  
**Joints — Fractures**  
**Rock Mechanics**  
**Compressive Strength**  
**Deformation — Fracture**

Features	<b>Suburban Areas</b>	<b>Data Analysis</b>
	<b>Sunshine</b>	<i>Drilling</i>
	<i>See Meteorology</i>	<i>Field Studies</i>
	<b>Supersonic Flight</b>	<i>Flume Studies</i>
	<i>See Aeronautics and Aerodynamics</i>	<i>Forecasting — Prediction</i>
	<i>Aircraft Flights</i>	<i>Gaging</i>
	<b>Support Structures</b>	<i>Water Level Recorders</i>
	<i>See Mechanics of Structures</i>	<i>Water Motion Recorders</i>
	<b>Surface Flow</b>	<i>Water Volume Recorders</i>
	<i>See Hydraulics</i>	<i>Geochronology</i>
	<i>Flow Types -- Natural Water</i>	<i>Geophysical Analysis</i>
	<b>Surface Water</b>	<i>Heavy Mineral Analysis</i>
	<i>See Water Types</i>	<i>In Situ Techniques</i>
	<b>Surface Waves</b>	<i>Infrared Techniques</i>
	<i>See Geophysics</i>	<i>Laboratory Analysis</i>
	<i>Seismology</i>	<i>Land Forming</i>
	<b>Surveying</b>	<i>Bench Leveling</i>
	<i>See Transportation Engineering</i>	<i>Slope Stabilization</i>
	<i>Basic Studies</i>	<i>Lysimeters</i>
	<b>Surveying Methods</b>	<i>Maps and Surveys</i>
	<i>See Techniques and Instrumentation</i>	<i>Charts</i>
	<b>Swamps — Marshes</b>	<i>Geologic Maps</i>
	<b>Swelling — Shrinking</b>	<i>Geologic Sections</i>
	<i>See Soil Science and Mechanics</i>	<i>Gravity Maps</i>
	<i>Physical Properties</i>	<i>Mine Maps</i>
	<b>Synoptic Weather Observations</b>	<i>Reconnaissance Maps</i>
	<i>See Meteorology</i>	<i>Soil Maps</i>
	<b>Synthetic Hydrology</b>	<i>Structure Contour Maps</i>
	<i>See Techniques and Instrumentation</i>	<i>Topographic Maps</i>
	<b>Systems Analysis</b>	<i>Mathematical Analysis</i>
	<i>See Information Systems Research</i>	<i>Measurements and Measuring</i>
	<i>Economic Theory</i>	<i>Acceleration</i>
	<i>See Techniques and Instrumentation</i>	<i>Mass</i>
	<b>Talus — Scree</b>	<i>Measuring Devices</i>
	<i>See Geomorphology</i>	<i>Pressure</i>
	<i>Mass Wasting</i>	<i>Vibration</i>
	<b>Taxes</b>	<i>Model Studies</i>
	<i>See Economics</i>	<i>Computer Models</i>
	<i>Income Analysis</i>	<i>Mathematical Models</i>
	<b>Technique Development</b>	<i>Physical Models</i>
	<i>See Techniques and Instrumentation</i>	<i>Monitoring</i>
	<b>Techniques and Instrumentation</b>	<i>Nuclear Moisture Meters</i>
	<i>See Also Meteorology</i>	<i>Observation Wells</i>
	<i>See Also Soil Science and Mechanics</i>	<i>Optical Instrumentation</i>
	<i>Biological Oxygen Demand Test</i>	<i>Imaging</i>
	<i>Borehole Logging</i>	<i>Photographic Instruments</i>
		<i>Pesticide Application</i>
		<i>Petrography</i>
		<i>Piezometry</i>
		<i>Pumping</i>
		<i>Remote Sensing</i>
		<i>Aircraft</i>

Atmospheric Stations  
Electromagnetic Radiation  
Infrared Radiation  
Lasers — Masers  
Microwave Radiation  
Radar  
Satellites  
Spectral Reflectance  
Sampling  
Simulation  
Surveying Methods  
Thermal Photography  
Instruction Surveying  
Leveling  
Plane Table Surveying  
Reconnaissance Surveying  
Sedimentation  
Synthetic Hydrology  
Design Flow  
Flow Routing  
Hydrographs  
Systems Analysis  
Technique Development  
Tidegauge  
Tracer Methods  
Technological Development  
Economics

Metagenesis  
Structural Geology  
Metamorphics  
Metagenic Clastics  
Sedimentology  
Sedimentary Rocks  
Tectonic History  
Stratigraphy  
Geologic History

Metamorphics  
Structural Geology  
Communication Networks  
Electronic Systems  
Communication Systems

Metreology  
Electronic Systems  
Communication Systems  
Techniques and Instrumentation

Seismology  
Geophysics  
Sedimentology  
Tidal Currents  
Geophysics  
Tidal Properties

Perpetuate  
Climate

See Soil Science and Mechanics  
Physical Properties  
See Water Quality  
Water Properties  
Temperature Instruments  
See Meteorology  
Techniques and Instrumentation

Temperature Mapping  
See Geophysics  
Geothermal Properties

Tensile  
See Engineering Mechanics  
Stresses

Terminals  
See Transportation Engineering

Terraces — Benches  
See Geomorphology  
Streams

Terrain Influences  
See Air Pollution  
Meteorological Aspects

Testing  
See Buildings and Land  
Development

Testing Facilities  
See Electronic Systems

Testing of Models  
See Information Systems Research  
Mathematical Models

Thermal  
See Engineering Mechanics  
Stresses

Thermal Features  
See Geomorphology  
Groundwater Features

Thermal Pollution  
See Water Quality  
Pollution Sources

Thermal Properties  
See Heat and Thermodynamics  
See Oceanography  
Sea Water Properties

Thermal Waters  
See Economic Geology  
Non-metallic Deposits

Thermodynamic Relations  
See Heat and Thermodynamics

Thermodynamics

See Structural Geology  
Faults

Thunderstorms  
See Meteorology  
Atmosphere Disturbance

Tidal Action  
See Hydraulics

Tides  
See Also Oceanography  
Sea Water Motion

Topographic Maps  
See Techniques and Instrumentation  
Maps and Surveys

Topography  
See Geomorphology  
Physiography

Tornadoes — Waterspouts  
See Meteorology  
Atmosphere Disturbance

Touring  
See Recreation  
Recreation Activities

Towers  
See Meteorology  
Techniques and Instrumentation

Trace Element Analysis  
See Geochemistry

Tracer Methods  
See Meteorology  
Techniques and Instrumentation  
See Techniques and Instrumentation

Tracers  
See Oceanography  
Oceanographic Techniques

Traffic Control  
See Transportation Engineering  
Traffic Engineering

Traffic Engineering  
See Transportation Engineering

Transform Faults  
See Structural Geology  
Faults

Transport Agents  
See Sedimentology  
Sediment Transport

Transport Effects  
See Sedimentology  
Sediment Transport

Transport Methods  
See Sedimentology

on and Management  
and Components  
s  
t  
Rock Mechanics  
and Hydraulics

Culverts

and Criteria

Classification

rol

arbors

engineering

emergency  
les

ol  
on Systems  
ehicles

ortation

on Systems  
ation Engineering

ing Mechanics  
oadings  
ycles

See Soil Science and Mechanics  
Techniques and Instrumentation

### **Trilateration**

See *Techniques and Instrumentation*  
Surveying Methods

### **Tropical**

See *Climates*

### **Trusses**

See *Mechanics of Structures*

### **Tsunamis**

See *Oceanography*  
Sea Water Motion

### **Tuff**

See *Igneous Rocks*

### **Tundra**

### **Turbidity**

See *Water Quality*  
Water Properties

### **Turbidity Currents**

See *Oceanography*  
Marine Geology

### **Turbulence**

See *Oceanography*  
Sea Water Motion

### **Turbulent Flow**

See *Hydraulics*  
Flow Types -- Natural Water

### **Unconsolidated Aquifers**

See *Aquifers*

### **Unconsolidated Deposits**

See *Sedimentology*  
Sedimentary Deposits

### **Under-water**

See *Buildings and Land*  
*Development*  
Construction

### **Underground Waste Disposal**

See *Water Quality*  
Pollution Sources

### **Unsteady Flow**

See *Hydraulics*  
Flow Types -- Natural Water

### **Uplift**

See *Soil Science and Mechanics*  
Pressures

### **Urban**

See *Transportation Engineering*  
Highway Classification

Urban Government  
See *Urban Research*

### **Urban Industry**

See *Urban Research*

### **Urban Planning**

See *Urban Research*

### **Urban Renewal**

See *Urban Research*

### **Urban Research**

*Housing*  
Housing Demand  
Housing Location  
Housing Rehabilitation  
Housing Types  
*Land Use*  
*Public Works*  
*Social Environment*  
*Urban Government*  
*Urban Industry*  
*Urban Planning*  
*Urban Renewal*  
*Urban Services*  
*Urban Transportation*  
*Urbanization*

### **Urban Runoff**

See *Water Runoff*

### **Urban Services**

See *Urban Research*

### **Urban Transportation**

See *Urban Research*

### **Urbanization**

See *Urban Research*

### **User Surveys**

See *Water Resources Management*

### **Utilities**

See *Buildings and Land*  
*Development*  
Building Classification

### **Valleys — Canyons**

See *Geomorphology*  
Streams

### **Valves**

See *Mechanical Power and*  
*Equipment*  
Control Devices

### **Vane Test**

See *Soil Science and Mechanics*  
Techniques and Instrumentation

### **Vibration**

See *Techniques and Instrumentation*

**Physical Properties**

**Volcanic Eruptions**

*See Volcanics*

**Volcanic Rocks**

*See Igneous Rocks*

**Volcanic Stratigraphy**

*See Stratigraphy*

**Volcanics**

*Pillow Lava*

*Volcanic Eruptions*

*Volcanoes*

**Volcanoes**

*See Geochemistry*

*See Structural Geology*

**Tectonic Features**

*See Volcanics*

**Vorticity**

*See Meteorology*

**Walls**

*See Buildings and Land*

*Development*

**Components and Equipment**

**Warehouses**

*See Transportation Engineering*

**Terminals**

**Warning Systems**

*See Also Electronic Systems*

**Washout — Scavenging**

*See Air Pollution*

**Meteorological Aspects**

**Waste Type**

*See Solid Waste Management*

**Waste Water Treatment/Disposal**

*Domestic Wastes*

*Industrial Wastes*

*Sewage System*

*Combined Sewers*

*Design and Location*

*Regional Systems*

*Septic Tanks*

*Sewage Treatment*

*Storage and Retention*

*Storm Sewers*

*Waste Water Disposal*

*Waste Water Treatment*

**Water Allocation**

*See Water Supply*

**Water Budget**

*See Water Supply*

**Water Circulation**

**Physical Properties**

**Water Content Test**

*See Soil Science and Mechanics*

**Techniques and Instrumentation**

**Water Currents**

**Water Cycle**

**Water Demand**

*See Water Resources Management*

**Water Deposited Clastics**

*See Sedimentology*

**Sedimentary Rocks**

**Water Drawdown**

**Water Infiltration**

**Water Law**

*See Law and Water*

**Water Level Fluctuation**

**Water Level Recorders**

*See Techniques and Instrumentation*

**Gaging**

**Water Loss**

*See Water Supply*

**Water Motion Recorders**

*See Oceanography*

**Oceanographic Instrumentation**

*See Techniques and Instrumentation*

**Gaging**

**Water Properties**

*See Water Quality*

**Water Quality**

*Path of Pollutants*

*Pollutant Identification*

*Pollution Effects*

*Pollution Sources*

*Agricultural Chemicals*

*Effluents — Waste Water*

*Forest Debris*

*Industrial Wastes*

*Mining Activities*

*Natural Sources*

*Nutrients*

*Organic Matter*

*Petroleum Wastes*

*Plant Pollutants*

*Radioactive Fallout*

*Saline Water Intrusion*

*Sanitary Landfills*

*Sediments*

*Sewage*

*Thermal Pollution*

*Underground Waste Disposal*

*Potable Water*

**Chemical**

**Color**

**Depth**

**Electrical**

**Ions and Gases in Water**

**Mineral Content**

**Organic**

**Physical**

**Salinity**

**Temperature**

**Turbidity**

**Water Quality Control**

**Baseline Studies**

**Desalination**

**Filtration**

**Pollution Abatement**

**Water Standards**

**Water Quantity Studies**

*See Water Supply*

**Water Resources Development**

*See Resources Management*

**Water Resources Economics**

*See Economics*

**Water Resources Management**

*Administrative Organizations*

*Alternative Planning*

*Control and Protection*

*Federal Government*

*Flood Control Planning*

*Land Use*

*Management*

*Multiple Purpose Projects*

*Non-structural Alternatives*

*Planning*

*Project Post-evaluation*

*Projections and Estimations*

*Social Aspects*

*State — Local Governments*

*User Surveys*

*Water Demand*

*Water Resources Development*

**Water Reuse**

*See Water Supply*

**Water Rights**

*See Law and Water*

**Water Runoff**

*Agricultural Runoff*

*Snowmelt Runoff*

*Storm Runoff*

*Urban Runoff*

**Water Shortage**

*See Water Supply*

**Supply**  
*See* **Recharge**  
**mentation**  
**unctive Use**  
**ervation**  
**smelt**  
**r Allocation**  
**r Budget**  
**r Loss**  
**oration**  
**otranspiration**  
**ndwater Mining**  
**ception**  
**r Quantity Studies**  
**able Water**  
**Volume**  
**r Quantity Variation**  
**r Yield**  
**r Reuse**  
**r Shortage**  
**r Storage**  
**r Supply Development**  
**r Supply Facility**  
**Buildings and Land**  
**elopment**  
**ing Classification**  
**r Table**  
**r Transportation**  
**Transportation Engineering**  
**transportation Systems**  
**r Types**  
**cedent Moisture**  
**s**  
**Water**  
**ndwater**  
**poric Water**  
**n Water**  
**ce Water**

**Gaging**  
**Water Wells**  
**Water Yield**  
*See* **Water Supply**  
**Water Quantity Studies**  
**Watershed Morphology**  
*See* **Geomorphology**  
**Watersheds**  
*Agricultural Watersheds*  
*Forest Watersheds*  
*Small Watersheds*  
**Wave Action**  
*See* **Hydraulics**  
**Wave Attenuation**  
*See* **Geophysics**  
**Seismology**  
**Wave Dispersion**  
*See* **Geophysics**  
**Seismology**  
**Wave Propagation Media**  
*See* **Geophysics**  
**Seismology**  
**Waves**  
*See Also* **Oceanography**  
*See* **Water Motion**  
**Weather**  
*See* **Transportation Engineering**  
**Basic Studies**  
**Weather Charts, Maps**  
*See* **Meteorology**  
**Weather Communication**  
*See* **Electronic Systems**  
**Communication Systems**  
**Weather Influences**  
*See* **Air Pollution**  
**Meteorological Aspects**

**Weathering Processes**  
*See* **Geomorphology**  
**Weirs**  
*See* **Hydraulics**  
**Welfare Economics**  
*See* **Economics**  
**Wetlands**  
**Wild Rivers**  
**Wilderness Areas**  
**Wind**  
*See* **Engineering Mechanics**  
**Forces and Loadings**  
*See* **Meteorology**  
**Wind — Water Interaction**  
*See* **Oceanography**  
**Air — Sea Boundary Studies**  
**Wind Direction**  
*See* **Meteorology**  
**Wind**  
**Wind Meters**  
*See* **Meteorology**  
**Techniques and Instrumentation**  
**Wind Profiles**  
*See* **Meteorology**  
**Wind**  
**Wind Shear**  
*See* **Meteorology**  
**Wind**  
**Wind Velocity**  
*See* **Meteorology**  
**Wind**  
**Wood Structures**  
*See* **Mechanics of Structures**  
**Zoning**  
*See* **Buildings and Land**  
**Development**  
**Land Use and Development**

## **Accidents**

*Also Transportation Engineering  
Traffic Engineering*

DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION ...16.0003

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME 1 - OPERATION STRUCTURE AND PROCEDURES ...16.0013

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) ...16.0014

## **Acoustics**

*Also Geophysics  
Seismology*

### **ACOUSTIC EMISSION**

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

SNOW PACK STABILITY INDICES RELATIVE TO THE CLIMAX AVALANCHE ...1.0013

### **SHOCK WAVES**

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

## **Administration & Planning**

*Public Health  
Community Health Services*

## **Administration and Management**

*Transportation Engineering*

## **Administrative Organizations**

*Water Resources Management*

## **Aerial Photography**

*See Techniques and Instrumentation  
Surveying Methods*

## **Aeromagnetics**

*See Geophysics  
Magnetic Properties*

## **Aeronautics and Aerodynamics**

### **AIRCRAFT FLIGHTS**

#### *Level Flight*

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

#### *Supersonic Flight*

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

### **AVIATION SAFETY- SURVIVAL**

SEARCH AND RESCUE COMMUNICATION--GLOBAL RESCUE ALARM NET (GRAN) ...16.0010

### **RESCUE OPERATIONS**

SEARCH AND RESCUE COMMUNICATION--GLOBAL RESCUE ALARM NET (GRAN) ...16.0010

THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL CARE SYSTEMS ...16.0024

## **Aerosols**

*See Air Pollution  
Types of Pollutants*

## **Aftershocks**

*See Geophysics  
Seismology*

Geomorphology  
Streams

See Water Runoff

## Aggregate

Soil Science and Mechanics  
Soil Types

## Agricultural Chemicals

Water Quality  
Pollution Sources

## Agricultural Costs

Economics  
Cost Analysis

## Agricultural Economics

Economics

## Agricultural Engineering

CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS  
...0020

SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES ...5.0046

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085

CHICKAMAUCHI RIVER WATERSHED PROJECT - TENNESSEE  
...0368

STABILIZATION OF STEEP LAND SLOPES - OHIO  
...0050

Industries

CONTAMINATION IN

DEVELOPMENT

IN TENNESSEE

## Agronomy

FOREST FIRE BEHAVIOR - CALIFORNIA ...5.0006

EFFECT OF PRESCRIBED BURNING ON WATER QUALITY AND QUALITY FROM BRUSH INFESTED LANDS IN TEXAS ...5.0022

SOYBEAN PHYSIOLOGY AND MANAGEMENT ...7.0004

## Air - Sea Boundary Studies

See Oceanography

## Air Mass

See Meteorology

## Air Patterns and Circulation

See Meteorology

## Air Photo Interpretation

See Soil Science and Mechanics  
Techniques and Instrumentation

## Air Pollution

NORTH RICHMOND - SAN PABLO BAY AREA STUDY  
CALIFORNIA ...6.0178

## AIR QUALITY STANDARDS

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

## DETECTION & MEASUREMENT

### Air Pollution Monitoring

RAINWATER CONTAMINATION BY VOLCANIC  
VOLATILES FROM KILAUEA VOLCANO, HAWAII  
(PHASE I) ...14.0015

### Chemical Analysis

RAINWATER CONTAMINATION BY VOLCANIC  
VOLATILES FROM KILAUEA VOLCANO, HAWAII  
(PHASE I) ...14.0015



## METEOROLOGICAL ASPECTS

### *Dispersion - Transport*

WATER CONTAMINATION BY VOLCANIC  
ATILES FROM KILAUEA VOLCANO, HAWAII  
SE I) ...14.0015

### *Terrain Influences*

ES OF URBAN EFFECTS ON RAINFALL AND  
ERE WEATHER ...2.0004

### *Washout - Scavenging*

ER STUDIES IN THE NATIONAL HAIL RESEARCH  
ERIMENT (NHRE) ...7.0017

### *Weather Influences*

ES OF URBAN EFFECTS ON RAINFALL AND  
ERE WEATHER ...2.0004

## TYPES OF POLLUTANTS

### *Aerosols*

ER STUDIES IN THE NATIONAL HAIL RESEARCH  
ERIMENT (NHRE) ...7.0017

### *Gases*

OPMENT OF IMPROVED TECHNIQUES FOR  
G PRESCRIBED FIRE IN SOUTHERN FORESTS  
342

OPMENT OF EMISSION FACTORS FOR ESTIMAT-  
ATMOSPHERIC EMISSIONS ...5.0044

WATER CONTAMINATION BY VOLCANIC  
ATILES FROM KILAUEA VOLCANO, HAWAII  
SE I) ...14.0015

### *Organic Compounds*

OPMENT OF EMISSION FACTORS FOR ESTIMAT-  
ATMOSPHERIC EMISSIONS ...5.0044

### *Particulates*

OPMENT OF IMPROVED TECHNIQUES FOR  
G PRESCRIBED FIRE IN SOUTHERN FORESTS  
342

NFLUENCE OF WEATHER AND CLIMATE ON  
EST FIRE OCCURRENCE AND BEHAVIOR IN THE  
' AND SOUTH ...5.0043

OPMENT OF EMISSION FACTORS FOR ESTIMAT-  
ATMOSPHERIC EMISSIONS ...5.0044

WATER CONTAMINATION BY VOLCANIC  
ATILES FROM KILAUEA VOLCANO, HAWAII  
SE I) ...14.0015

### *Radioactivity*

ER STUDIES IN THE NATIONAL HAIL RESEARCH  
ERIMENT (NHRE) ...7.0017

CONTRACT FOR PARTIAL SUPPORT OF THE COMMIT-  
TEE ON FIRE RESEARCH ...5.0008

CORRELATION OF SATELLITE AND GROUND DATA IN  
AIR POLLUTION STUDIES (ABBREV) ...5.0032

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

DEVELOPMENT OF EMISSION FACTORS FOR ESTIMAT-  
ING ATMOSPHERIC EMISSIONS ...5.0044

## Air Pollution Monitoring

*See Air Pollution*  
*Detection & Measurement*

## Air Pressure - Density

*See Meteorology*

## Air Quality Standards

*See Air Pollution*

## Air Temperature

*See Meteorology*

## Air Turbulence

*See Meteorology*

## Aircraft Fire

*See Fire Research*  
*Types of Fire*

## Aircraft Flights

*See Aeronautics and Aerodynamics*

## Airfield Sites

*See Geomorphology*  
*Engineering Geology*

## Algal Studies

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
6.0020

*See Sedimentology  
Sedimentary Deposits*

### **Alluvial Fans**

*See Geomorphology  
Streams*

### **Alternative Planning**

*See Water Resources Management*

### **Andesite**

*See Igneous Rocks*

### **Annual Discharge**

*See Hydraulics  
Discharge*

### **Antecedent Moisture**

*See Water Types*

### **Antennas**

*See Electronic Systems*

### **Aquatic Plants**

*See Ecology*

### **Aqueducts**

*See Hydraulics*

### **Aquicludes**

LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
STUDY THE EXTENT, MAGNITUDE R ...10.0018

### **Aquifers**

EASTERN SNAKE RIVER PLAIN REGION INVESTIGA-  
TIONS - IDAHO ...3.0179

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068  
IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237  
MONTEREY BAY - CALIFORNIA ...9.0030  
CONTINUING QUANTITATIVE GROUND-WATER STU-  
DIES IN THE HOUSTON DISTRICT ...10.0013  
LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
STUDY THE EXTENT, MAGNITUDE R ...10.0018  
CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF  
COAST AREA ...10.0032  
SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013  
ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

### **CLASTIC AQUIFERS**

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
STUDY ...6.0310

### **UNCONSOLIDATED AQUIFERS**

WATER RESOURCES OF THE RED RIVER OF THE  
NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

### **Arch Dams**

*See Hydraulics  
Dams*

### **Arid and Desert**

*See Climates*

### **Artesian Flow**

*See Hydraulics  
Flow Types - Natural Water*

### **Artificial Islands**

*See Hydraulics*

### **Artificial Recharge**

*See Water Supply*

### **Atmosphere Disturbance**

*See Meteorology*

*Meteorology*

## **Atmospheric Radiation**

*Meteorology*

## **Atomic Plants**

AGE SURVEY, SAN FERNANDO EARTHQUAKE OF  
BRUARY 9, 1971 ...3.0017

RAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
...0056

TEREY-POINT REYES (EARTHQUAKE) - CALIFOR-  
A ...3.0120

H CAROLINA SEISMICITY PROGRAM ...3.0168

LOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
ANNING, CALIFORNIA ...16.0055

## **Automatic Data Aquisition**

*Techniques and Instrumentation*  
*Data Acquisition*

## **Automatic Stations - Networks**

*Meteorology*  
*Techniques and Instrumentation*

## **Automobile & Components**

*Transportation Engineering*

## **Aviation Safety- Survival**

*Aeronautics and Aerodynamics*

## **Axial**

*Engineering Mechanics*  
*Forces and Loadings*

## **Backfills**

*Soil Science and Mechanics*

## **Barriers**

*Geomorphology*

*See Geomorphology*  
*Shoreline Geomorphology*  
*See Mechanics of Structures*

## **Basalt**

*See Igneous Rocks*

## **Base Flow of Streams**

STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090

HYDROGRAPH MODEL STUDIES OF THE HILL-  
SBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS,  
FLORIDA ...6.0234

THE EFFECTS OF LAND USE CHANGE ON THE  
HYDROLOGY OF AN URBAN WATERSHED ...6.0242

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

## **Baseline Studies**

*See Water Quality*  
*Water Quality Control*

## **Basins**

*See Structural Geology*  
*Tectonic Features*

## **Bathymetry**

*See Oceanography*  
*Oceanographic Techniques*

## **Bathythermographs**

*See Oceanography*  
*Oceanographic Instrumentation*

## **Bays - Bights**

PUGET PEAK AVALANCHE, ALASKA ...1.0007

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

HAWAII ENVIRONMENTAL SIMULATION MODEL  
...6.0252

TEXAS COAST HURRICANE SURGE MODEL STUDIES  
...8.0013

ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027

PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...8.0047

MANAUA BAY HURRICANE BARRIER STUDY, NEW

*Also Geomorphology*  
*Shoreline Geomorphology*

CHANGES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014

BEACH CHANGES BY EXTRAORDINARY WAVES  
CAUSED BY HURRICANE CAMILLE ...8.0103

WINDY CONDITIONS AND AUTOMATED FORECASTS  
FOR THE ATLANTIC COASTAL STORM OF FEBRUARY  
20, 1972 ...8.0115

CASTING STORM-INDUCED BEACH CHANGES  
ALONG VIRGINIA'S OCEAN COAST ...8.0134

SEDIMENT SPACE CENTER OCEAN BEACH EROSION -  
FLORIDA ...15.0005

PORT HARBOR, FLORIDA PARTIAL BEACH RESTORA-  
TION, BEACH EROSION CONTROL AND HURRICANE  
PROTECTION PROJECT, DADE COUNTY, FLORIDA  
...5.0006

LONG ISLAND, GEORGIA, BEACH EROSION CONTROL  
AND HURRICANE PROTECTION ...15.0007

BEACH EROSION PROJECT, DELAWARE COAST PRO-  
TECTION PROJECT, DELAWARE ...15.0010

CHESAPEAKE BEACH, VIRGINIA - BEACH EROSION CON-  
TROL AND HURRICANE PROTECTION ...15.0011

COASTAL WORKS EVALUATION - CALIFORNIA,  
FLORIDA ...15.0015

COASTAL ENGINEERING STUDIES RELATED TO  
FLORIDA'S SHORELINE AND BEACH EROSION  
PROBLEMS ...15.0016

STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

COASTAL INLETS - FORMS OF SEDIMENT AC-  
CUMULATION IN THE BEACH ZONE - ALASKA, NEW  
ENGLAND ...15.0022

EROSION MODEL FOR STORM CYCLES AND BEACH  
EROSION ON LAKE MICHIGAN ...15.0024

ENVIRONMENTAL GEOMORPHIC STUDY OF THE  
COASTAL REGIMES ALONG THE SOUTH SHORE OF  
LONG ISLAND - NEW YORK ...15.0027

FIELD STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
SHARP POINT AND PORT JEFFERSON HARBOR  
...5.0028

BEACH EROSION STUDY OF ERIE COUNTY, OHIO  
...5.0030

PROPERTIES AND STABILITY OF A TEXAS BARRIER  
BEACH INLET ...15.0035

INVESTIGATION OF SHORELINE CHANGES AT SAR-  
ASOT BEACH, TEXAS ...15.0036

*See Techniques and Instrumentation*  
*Land Forming*

**Bending**

*See Engineering Mechanics*  
*Stresses*

**Benthic Environment**

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

**Bibliography**

*See Publications*

**Bicycling**

*See Recreation*  
*Recreation Activities*

**Biological**

*See Water Quality*  
*Water Properties*

**Biological Oceanography**

*See Oceanography*

**Biological Oxygen Demand Test**

*See Techniques and Instrumentation*

**Biomes, Terrestrial**

*See Ecology*

## Boating

See *Recreation*  
*Recreation Activities*

## Building Fire

See *Fire Research*  
*Types of Fire*

## Body Waves

See *Geophysics*  
*Seismology*

## Borehole Logging

See *Techniques and Instrumentation*

## Bottom Sampling Devices

See *Oceanography*  
*Oceanographic Instrumentation*

## Bottom Topography

See *Oceanography*  
*Marine Geology*

## Boundary Layer Studies

See *Meteorology*

## Breakwaters

See *Hydraulics*

## Bridge Sites

See *Geomorphology*  
*Engineering Geology*

## Bridges and Culverts

See *Transportation Engineering*

## Brines

## Buildings & Land Development

### BUILDING CLASSIFICATION

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER STRUCTURES SURROUNDED BY WATER ...3.0034

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS ...3.0041

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042

ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO EARTHQUAKE ...3.0055

A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE ...3.0269

LUBBOCK TORNADO - A SURVEY OF BUILDING DAMAGE IN AN URBAN AREA - TEXAS ...12.0004

NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS ...12.0019

### Commercial

PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973 ...3.0007

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 ...6.0295

### Educational Facilities

EARTHQUAKE SAFETY OF SCHOOL BUILDINGS ...3.0075

### High-rise

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE ...3.0026

EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS INCLUDING FOUNDATION INTERACTION ...3.0030

IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN

...TARY FACILITIES (ABBREV) ...4.0002  
 STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...10.0010

*Mining*

LOCATION OF SLOPE FAILURE PLANES ...9.0009  
 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO ...10.0031

*Mobile Homes*

DISASTER INVESTIGATIONS ...12.0001  
 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY ...16.0089

*Public Service*

SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042

*Recreational*

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197  
 COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS ...6.0148  
 SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182  
 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...16.0081

*Residential*

STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A ...3.0002  
 PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973 ...3.0007  
 INVESTIGATION OF GROUND MOTION-DAMAGE RELATIONSHIPS FOR RESIDENTIAL BUILDINGS IN GLENDALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE, FEBRUARY 1 ...3.0013  
 PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0021  
 THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969 ...3.0025  
 FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD ...3.0195  
 SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229  
 SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042  
 COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS ...6.0148  
 RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 ...6.0295  
 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...16.0081  
 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY ...16.0089

...TIVITY ANALYSES AND GRAPHICAL METHOD OF PRELIMINARY SOLUTIONS ...3.0062  
 ...AGE PROBABILITY MATRICES FOR PROTOTYPE BUILDINGS ...3.0063  
 ...TIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-FAILURE SYSTEMS ...3.0085  
 ...UM DESIGN OF EARTHQUAKE-RESISTANT FRAME BUILDINGS ...3.0090  
 ...MIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING ...3.0091  
 ...AL COUPLING AND EARTHQUAKE RESPONSE OF STEEL BUILDINGS ...3.0141  
 ...ED VIBRATION OF A 22-STORY STEEL FRAME BUILDING ...3.0144  
 ...YSIS OF THE EARTHQUAKE RESPONSE OF A THREE-STORY STEEL FRAME BUILDING DURING THE 1907 FERNANDO EARTHQUAKE ...3.0148  
 ...STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH-RISE BUILDINGS ...3.0158  
 ...QUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211  
 ...MIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229  
 ...ODOLOGY AND PILOT APPLICATION ...3.0230  
 ...GE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING REGIONS SUBJECTED TO NATURAL HAZARDS ...3.0257  
 ...STER INVESTIGATIONS ...6.0001  
 ...D-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS ...12.0018

*Hospitals*

HOSPITAL SITE EVALUATIONS ...3.0177  
 ...UATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

*Low Cost Housing*

...IGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...6.0077

*Manufacturing*

...PREHENSIVE PLAN, CITY OF HAMILTON, TEXAS ...6.0148  
 ...ING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA ...6.0232  
 ...DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 ...6.0295  
 ...MINIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130

ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...16.0081

### *Water Supply Facility*

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...3.0198

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME 1 - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV) ...6.0308

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT ...15.0038

### *Components and Equipment*

PROBABILISTIC METHODS IN CIVIL ENGINEERING ...3.0208

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229

### *Floors*

STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099

### *Piping Systems*

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0017

SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265

### *Roofs*

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

INVESTIGATION OF GROUND MOTION-DAMAGE RELATIONSHIPS FOR RESIDENTIAL BUILDINGS IN GLENDALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE, FEBRUARY 1 ...3.0013

DYNAMIC ANALYSIS OF COUPLED SHEAR WALLS AND SANDWICH BEAMS ...3.0045

QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058

DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING ...3.0091

STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099

STRENGTH OF EXISTING MASONRY WALLS ...3.0189

DESIGN CRITERIA FOR MASONRY ...3.0194

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211

EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

### *Construction*

INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS ...6.0086

### *Codes and Standards*

REPORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION ...3.0004

PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0021

APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA ...3.0136

BUILDING PRACTICES FOR DISASTER MITIGATION ...3.0188

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...3.0191

BUILDING PRACTICES FOR DISASTER MITIGATION ...3.0192

DESIGN CRITERIA FOR MASONRY ...3.0194

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION ...3.0218

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229

SAN HYDROLOGY OF FOWAY VALLEY, CALIFORNIA 6.0169  
DOD-PROOFING REGULATIONS ...6.0358

#### Cost Financing

LDING PRACTICES FOR DISASTER MITIGATION 3.0192  
RTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005

#### Earthquake-type

DIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A ... 3.0002  
ERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY RIDGES ...3.0003  
PORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION ...3.0004  
N NORMAN RESERVOIRS AREA, CALIFORNIA ...3.0006  
ELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973 ...3.0007  
OGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0009  
RTHQUAKE - INDUCED EMBANKMENT DISTRESS ...3.0010  
E SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE ...3.0012  
SMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW RISE BUILDINGS - COLORADO ...3.0016  
MAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0017  
GINEERING SEISMOLOGY ...3.0019  
PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0021  
SPONSE OF POWER SYSTEMS TO THE SAN FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0023  
E SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969 ...3.0025  
MAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE ...3.0026  
W-CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES ...3.0027  
RTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS INCLUDING FOUNDATION INTERACTION ...3.0030  
RTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS ...3.0031  
ERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION ...3.0032

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040  
EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS ...3.0041  
NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042  
ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO EARTHQUAKE ...3.0055  
HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES ...3.0056  
QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058  
SEISMIC DESIGN OF LOW-RISE BUILDINGS ...3.0059  
SENSITIVITY ANALYSES AND GRAPHICAL METHOD FOR PRELIMINARY SOLUTIONS ...3.0062  
DAMAGE PROBABILITY MATRICES FOR PROTOTYPE BUILDINGS ...3.0063  
SUMMARY OF METHODOLOGY AND PILOT APPLICATION ...3.0064  
STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (FS 047) ...3.0065  
EARTHQUAKE RESISTANCE OF EARTH AND ROCK-FILL DAMS ...3.0066  
STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS ...3.0068  
REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL REPORT ...3.0069  
STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS ...3.0073  
EARTHQUAKE SAFETY OF SCHOOL BUILDINGS ...3.0075  
EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076  
GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079  
CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFORMATION OF ENGINEERING MATERIALS ...3.0081  
ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085  
INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES ...3.0086  
CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088  
CYCLIC LOADING OF FULL-SIZE CONNECTIONS ...3.0089  
OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090



STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099

RECOMMENDATIONS DEVELOPED FROM REPORTS OF THE EARTHQUAKE COMMISSION AND EARTHQUAKE TASK FORCES - SAN FERNANDO EARTHQUAKE (ABBREV) ...3.0101

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102

SANTA CRUZ COUNTY COOP ...3.0106

EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION ...3.0107

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115

APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA ...3.0136

APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING ...3.0137

EVALUATION OF THE INCREMENTAL SEISMIC RISK DUE TO RESERVOIR FILLING ...3.0142

THREE-YEAR OPERATION OF THE UNIVERSITIES COUNCIL FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0143

FORCED VIBRATION OF A 22-STORY STEEL FRAME BUILDING ...3.0144

ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE ...3.0148

THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN ...3.0149

MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY ...3.0150

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

ELASTOMERIC ENERGY ABSORBER ...3.0152

ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE ...3.0154

FHA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH-RISE BUILDINGS ...3.0158

ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159

SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES ...3.0164

VA. SEISMICITY - 32 STATES AND PUERTO RICO ...3.0165

SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168

EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171

GREATER ANCHORAGE AREA BOROUGH, ALASKA ...3.0172

STRENGTH OF EXISTING MASONRY WALLS ...3.0189

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...3.0191

BUILDING PRACTICES FOR DISASTER MITIGATION ...3.0192

EARTHQUAKE DESIGN FOR MASONRY STRUCTURES ...3.0193

DESIGN CRITERIA FOR MASONRY ...3.0194

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

PROTECTION OF TRANSPORTATION FACILITIES AGAINST EARTHQUAKES ...3.0199

EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES ...3.0201

EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203

TECHNIQUES FOR RETROFITTING EXISTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE ...3.0204

EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN ...3.0206

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

PROBABILISTIC METHODS IN CIVIL ENGINEERING ...3.0208

RESPONSE AND ENERGY-DISSIPATION OF REINFORCED CONCRETE FRAMES SUBJECTED TO STRONG BASE MOTIONS ...3.0210

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211

EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION ...3.0218

SEISMIC RESEARCH ...3.0225

INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES ...3.0227

NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229

METHODOLOGY AND PILOT APPLICATION ...3.0230

PROBABILITY OF FATIGUE FAILURE UNDER EARTHQUAKE LOADS ...3.0251

A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING ...3.0252

ADAPTIVE STRUCTURAL SYSTEMS ...3.0253

SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254

DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL SYSTEMS ...3.0255

EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE ...3.0269

DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS ...3.0271

INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE ...3.0273

THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE ...3.0274

BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN ...3.0281

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS ...3.0282

DISASTER INVESTIGATIONS ...6.0001

DENVER METROPOLITAN AREA, COLORADO ...9.0042

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

#### *Excavation*

GREATER ANCHORAGE AREA BOROUGH, ALASKA ...3.0172

#### *Methods*

EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES ...3.0037

LUBBOCK TORNADO - A SURVEY OF BUILDING DAMAGE IN AN URBAN AREA - TEXAS ...12.0004

BUILDING PRACTICES FOR DISASTER MITIGATION ...16.0073

#### *Sites*

PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0021

GREATER ANCHORAGE AREA BOROUGH, ALASKA ...3.0172

V. A. HOSPITAL SITE EVALUATIONS ...3.0177

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...3.0191

ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA ...6.0232

#### *Under-water*

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER STRUCTURES SURROUNDED BY WATER ...3.0034

#### *Design*

SENSITIVITY ANALYSES AND GRAPHICAL METHOD FOR PRELIMINARY SOLUTIONS ...3.0062

OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090

APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA ...3.0136

SEISMIC DESIGN FOR BUILDINGS ...3.0187

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...3.0191

INELASTIC DESIGN OF BUILDINGS

LUBBOCK TORNADO - A SURVEY OF BUILDING DAMAGE IN AN URBAN AREA - TEXAS ...12.0004

WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS ...12.0018

#### *Codes and Standards*

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

SUMMARY OF METHODOLOGY AND PILOT APPLICATION ...3.0064

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076

ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE ...3.0154

EARTHQUAKE DESIGN FOR MASONRY STRUCTURES ...3.0193

EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES ...3.0201

EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

METHODOLOGY AND PILOT APPLICATION ...3.0230

SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254

SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265

ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI ...6.0309

FLOOD-PROOFING REGULATIONS ...6.0358

HURRICANE EFFECTS ON PORT FACILITIES ...8.0076

#### *Environmental*

ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT ...16.0054

#### *Structural*

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211

EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229

SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265

#### *Fire Considerations*

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

#### *Land Use and Development*

STUDIES OF URBAN EFFECTS ON RAINFALL AND

...3.0172  
 BUILDING PRACTICES FOR DIASER MITIGATION ...3.0188  
 SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197  
 RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION ...3.0218  
 STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA ...6.0157  
 IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237  
 HAWAII ENVIRONMENTAL SIMULATION MODEL ...6.0252  
 ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272  
 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV) ...8.0011  
 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV) ...8.0012  
 DENVER METROPOLITAN AREA, COLORADO ...9.0042  
 SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043  
 HAMILTON 2 DEGREE ...9.0048  
 DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020

XENIA REBUILDS ...12.0006  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056  
 BUILDING PRACTICES FOR DISASTER MITIGATION ...16.0073  
 ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COASTAL ZONE, GALVESTON-HOUSTON AREA ...16.0104

#### *Impact of Land Use*

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141  
 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169

#### *Planning*

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109  
 PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA ...3.0121  
 THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN ...3.0149  
 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...3.0198  
 LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS ...3.0257

NEW YORK STATE, CALIFORNIA GENERAL PLAIN TECHNICAL REPORT ...6.0042  
 DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116  
 COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS ...6.0148  
 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260  
 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY ...6.0283  
 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV) ...6.0308  
 PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330  
 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332  
 NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE ...6.0333  
 MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN ...6.0363  
 ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT ...16.0054

#### *Zoning*

DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA ...6.0028  
 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169  
 SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS ...6.0231  
 ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA ...6.0232  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233  
 ZONING ORDINANCE - KNOX COUNTY, INDIANA ...6.0268  
 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY ...6.0283  
 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY ...6.0284  
 RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 ...6.0295  
 ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI ...6.0309  
 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332

#### *MAINTENANCE*

THE FORMULATION AND EXPERIMENTAL  
TION OF MATHEMATICAL MODELS FOR PREDICTING  
DYNAMIC RESPONSE OF MULTISTORY BUILDINGS  
...3.0061

STRUCTURAL MODEL TESTS OF EARTHQUAKE EF-  
FECTS (ES 047) ...3.0065

DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY  
BRACED STEEL BUILDING ...3.0091

APPLICATION OF DECISION THEORY IN STRUCTURAL  
DESIGN FOR RESISTANCE TO LOADINGS GENERATED  
BY EARTHQUAKE PHENOMENA ...3.0136

MODAL COUPLING AND EARTHQUAKE RESPONSE OF  
TALL BUILDINGS ...3.0141

PROBABILISTIC METHODS IN CIVIL ENGINEERING  
...3.0208

EVALUATION OF STRUCTURAL DAMAGE CAUSED BY  
EARTHQUAKE TOWARD THE DEVELOPMENT OF  
EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

#### **SAFETY**

COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGET-  
ING FOR EARTHQUAKE HAZARD MITIGATION  
...3.0008

EARTHQUAKE SAFETY OF SCHOOL BUILDINGS ...3.0075

THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN  
...3.0149

MEETING THE EARTHQUAKE CHALLENGE - FINAL RE-  
PORT TO THE LEGISLATURE STATE OF CALIFORNIA  
BY THE JOINT COMMITTEE ON SEISMIC SAFETY  
...3.0150

BUILDING PRACTICES FOR DISASTER MITIGATION  
...3.0192

PROBABILISTIC METHODS IN CIVIL ENGINEERING  
...3.0208

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
BUILDINGS ...3.0211

A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN  
EARTHQUAKE ENGINEERING ...3.0252

DISASTER INVESTIGATIONS ...6.0001

EVALUATION OF FLOOD PEAK PREDICTION METHODS  
IN SEMI-ARID REGIONS IN RELATION TO DAM  
SAFETY ...6.0322

#### **TESTING**

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
BUILDINGS ...3.0211

LUBBOCK TORNADO - A SURVEY OF BUILDING  
DAMAGE IN AN URBAN AREA - TEXAS ...12.0004

#### **Bulkheads**

*See Hydraulics*

#### **Buried Structures**

*See Soil Science and Mechanics*

#### **Camping**

*See Recreation  
Recreation Activities*

#### **Canals**

RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE  
COUNTY, FLORIDA ...6.0069

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

FLOOD/HYDROLOGY INVESTIGATIONS ...6.0183

LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
STUDY THE EXTENT, MAGNITUDE R ...10.0018

#### **Cantilevers**

*See Mechanics of Structures*

#### **Caves - Sink Holes**

*See Geomorphology  
Groundwater Features*

#### **Channels**

*See Also Hydraulics*

AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157

CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS  
RELATING TO CHANNEL DEVELOPMENT, EROSION,  
& BANK & LEVEE PROTECTION ...6.0053

JACKSON HOLE FLOOD CONTROL PROJECT ...6.0054

FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH  
ADAMS MASSACHUSETTS ...6.0120

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
NORTH CAROLINA ...6.0135

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
NORTH CAROLINA ...6.0136

INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES  
...6.0189

STARKWEATHER WATERSHED, NORTH DAKOTA  
...6.0204

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA  
...6.0212

FLOOD INUNDATION STUDY - WISCONSIN ...6.0248

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255

SMALL STREAMS FLOOD FREQUENCY IN MAINE  
...6.0287

MODEL STUDY OF CANNELTON LOCKS AND DAM,  
OHIO RIVER, INDIANA AND KENTUCKY ...6.0312

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS-  
SOURI ...6.0319

EFFECTS OF URBANIZATION ON FLOODS AT MORGAN-  
TON, NORTH CAROLINA ...6.0343

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

FLOODING OF SMALL STREAMS IN NASHVILLE-DAVID-  
SON COUNTY AREA, TENNESSEE ...6.0370

SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLO-  
GY IN THE CENTRAL APPALACHIAN REGION - VIR-  
GINIA ...6.0395

FLOOD HAZARD INFORMATION - BUFFALO CREEK,  
LOGAN COUNTY, WEST VIRGINIA POST-DISASTER  
CONDITIONS ...6.0405

ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027

EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HUR-  
RICANE SURGE CONTROL STRUCTURES AND MISSIS-  
SIPPI RIVER-GULF OUTLET CHANNEL ...8.0048

REGULATION OF GREAT LAKES WATER LEVELS RE-  
PORT TO THE INTERNATIONAL JOINT COMMISSION  
BY THE INTERNATIONAL GREAT LAKES LEVELS  
BOARD ...16.0041

## Charts

*See Techniques and Instrumentation  
Maps and Surveys*

## Chemical Analysis

*See Air Pollution  
Detection & Measurement  
See Techniques and Instrumentation*

## Chemical Engineering

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

...5.0042

EVALUATION OF 'ION EXCHANGE' LANDSLIDE COR-  
RECTION TECHNIQUE - CALIFORNIA ...9.0038

EVALUATION OF THE ION EXCHANGE LANDSLIDE  
CORRECTION TECHNIQUE ...9.0039

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR  
ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

## Chemical Reactions

CONTROL AND USE OF FIRE PARTICULARLY IN WIL-  
DERNESS, PARK, AND OTHER RECREATIONAL AREAS  
...5.0020

TRACER STUDIES IN THE NATIONAL HAIL RESEARCH  
EXPERIMENT (NHRE) ...7.0017

## Chutes

*See Hydraulics*

## Cirques

*See Glaciology  
Glacial Features*

## Civil Defense

*See National and Civil Defense*

## Clastic Aquifers

*See Aquifers*

## Clay

*See Soil Science and Mechanics  
Soil Types*

## Clear Cutting

*See Forestry  
Silviculture*

## Climates

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
...5.0002

INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

LOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS  
ALABAMA ...6.0214

LOOD-FREQUENCY AND BASIN PARAMETER RELA-  
TIONSIPS IN SMALL DRAINAGE AREAS ...6.0215

IMATES OF THE STATES - CLIMATE OF NEW YORK  
6.0289

AINAGE STUDY - INVENTORY AND ANALYSIS  
6.0340

ATHER MODIFICATION IN NORTH DAKOTA ...7.0006

IONAL SLOPE STABILITY STUDIES - CALIFORNIA  
ND PENNSYLVANIA ...9.0002

IRONMENTAL GEOLOGIC ATLAS OF THE TEXAS  
OASTAL ZONE, GALVESTON-HOUSTON AREA  
16.0104

#### ALPINE

USTIC EMISSION AND RELATED PROPERTIES OF  
NOW APPLIED TO THE DETERMINATION OF SLAB  
VALANCHE INITIATION ...1.0005

TER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
OCKY MOUNTAINS ...1.0011

YSICAL PROPERTIES OF ALPINE SNOW AS RELATED  
O WEATHER AND AVALANCHE CONDITIONS  
1.0012

MODEL OF THE FORESTS OF GLACIER NATIONAL  
ARK, MONTANA ...5.0021

#### ARID AND DESERT

JECT ARID DROP, A SUMMARY REPORT OF CLOUD  
EEDING ACTIVITIES IN ARIZONA AS CONDUCTED  
Y ATMOSPHERICS INCORPORATED (ABBREV)  
2.0008

OOD AND SEDIMENT REDUCTION IN STEEP UNSTA-  
BLE BRUSHLANDS OF THE SOUTHWEST ...6.0041

#### SEMI-ARID

DROLOGY OF SMALL WATERSHEDS ...6.0190

ALUATION OF FLOOD PEAK PREDICTION METHODS  
N SEMI-ARID REGIONS IN RELATION TO DAM  
AFETY ...6.0322

UDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415

#### TROPICAL

ATLANTIC HURRICANE SEASON OF 1972 ...8.0005

TROPICAL CYCLONES ...8.0055

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

HURRICANE-TYPHOON DYNAMICS ...8.0063

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL  
DISTURBANCES ...8.0099

#### Climatography

*See Meteorology*  
*Climatology*

#### Climatology

*See Meteorology*

#### Clinical Psychology

THE UNPREDICTABLE DISASTER IN A METROPOLIS -  
PUBLIC RESPONSE TO THE LOS ANGELES  
EARTHQUAKE OF FEBRUARY, 1971 ...3.0074

INELASTIC RESPONSE OF BUILDINGS AND STRUC-  
TURAL RESTORATION ...3.0190

PROFILING THE FOREST INCENDIARIST - AN ANALYSIS  
OF DOCUMENTED CASE HISTORIES ...5.0001

CHARACTERISTICS OF PEOPLE WHO START FIRES  
...SOME PRELIMINARY FINDINGS - CALIFORNIA  
...5.0036

SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EF-  
FECTS ...6.0003

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN CENTRAL REGION, COMMON-  
WEALTH OF PENNSYLVANIA ...6.0008

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN LUZERNE-WYOMING COUNTIES  
OF THE COMMONWEALTH OF PENNSYLVANIA  
...6.0009

TRAINING AND EVALUATION OF MENTAL HEALTH  
SERVICES TO RESIDENTS OF FLOOD DISASTER  
AREAS IN COMMONWEALTH OF PENNSYLVANIA  
...6.0010

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN LUZERNE-WYOMING COUNTIES,  
COMMONWEALTH OF PENNSYLVANIA ...6.0011

...16.0020  
 FIELD STUDIES OF DISASTER BEHAVIOR - AN INVENTOR...16.0064  
 COLLABORATIVE RESEARCH ON NATURAL HAZARDS...16.0094

## Clouds

*See Meteorology*

## Coal

*See Economic Geology*  
*Non-metallic Deposits*

## Coastal Engineering

*See Hydraulics*

## Coastlines - Shorelines

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109  
 EARTHQUAKE HAZARDS REDUCTION-NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128  
 AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157  
 SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...4.0006  
 FLOOD INSURANCE STUDY ...6.0005  
 FLOOD INSURANCE STUDY ...6.0006  
 DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116  
 FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE ...6.0235  
 FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236  
 SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386  
 SURVEY OF LAKE FLOODING FROM ERTS-I - LAKE CHAMPLAIN ...6.0393  
 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA ...8.0002

...8.0012  
 EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA ...8.0026  
 THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST ...8.0049  
 STATISTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (ABBREVIATED) ...8.0070  
 STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072  
 HURRICANE EFFECTS ON PORT FACILITIES ...8.0076  
 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - 1. LANDFALL STORMS ...8.0110  
 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS ...8.0111  
 MARINE ENVIRONMENTAL PREDICTION ...8.0113  
 MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972 ...8.0115  
 ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE ...8.0132  
 FORECASTING STORM-INDUCED BEACH CHANGES ALONG VIRGINIA'S OCEAN COAST ...8.0134  
 ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...10.0016  
 NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN ...12.0013  
 TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS ...13.0015  
 ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...13.0017  
 LONG-PERIOD WAVES AND SURGES ...13.0019  
 TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY ...13.0028  
 BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE ...15.0010  
 A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017  
 NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT ...15.0019  
 NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION ...15.0021  
 OFFSET COASTAL INLETS - FORMS OF SEDIMENT ACCUMULATION IN THE BEACH ZONE - ALASKA, NEW ENGLAND ...15.0022  
 PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN ...15.0025  
 COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES ...15.0026

RE EROSION STUDY OF ERIE COUNTY, OHIO  
5.0030

RE EROSION STUDY OF LAKE COUNTY, OHIO  
5.0031

RE EROSION STUDIES ALONG THE OHIO SHORE OF  
LAKE ERIE ...15.0032

EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC  
FACTORS INFLUENCING EROSION OF THE OREGON  
COAST ...15.0033

AS BARRIER ISLANDS ...15.0037

LOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS  
COASTAL ZONE, GALVESTON-HOUSTON AREA  
6.0104

## **Codes and Standards**

*Buildings & Land Development*  
*Construction*  
*Design*

## **Cohesion**

*Soil Science and Mechanics*  
*Mechanical Properties*

## **Color**

*Water Quality*  
*Water Properties*

## **Columns**

*Mechanics of Structures*

## **Combined Sewers**

*Waste Water Treatment/Disposal*  
*Wastewater System*

## **Combustion**

*Fire Research*

## **Commercial**

*Buildings & Land Development*  
*Building Classification*

## **Communication Systems**

*See Electronic Systems*

## **Communication Theory**

*See Information Systems Research*

## **Community Health Services**

*See Public Health*

## **Community Mental Health Center**

*See Public Health*  
*Community Health Services*

## **Community Studies**

*See Social Sciences*

## **Compaction Test**

*See Soil Science and Mechanics*  
*Techniques and Instrumentation*

## **Composite Structures**

*See Mechanics of Structures*

## **Compressive**

*See Engineering Mechanics*  
*Stresses*

## **Compressive Strength**

*See Soil Science and Mechanics*  
*Mechanical Properties*  
*See Structural Geology*  
*Rock Mechanics*

## **Computer Methods**

*See Techniques and Instrumentation*



## Computer Programming

SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE RESPONSE ANALYSIS OF HORIZONTALLY LAYERED SITES ...3.0035

ADAP - A COMPUTER PROGRAM FOR STATIC AND DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079

STATIC AND EARTHQUAKE ANALYSIS OF THREEDIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099

SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS ...3.0271

OPSET - PROGRAM FOR COMPUTERIZED SELECTION OF WATERSHED PARAMETER VALUES FOR THE STANFORD WATERSHED MODEL ...6.0285

INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396

THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA ...7.0016

GRAPHICAL DISPLAY OF HURRICANE FORECASTS ...8.0090

## Computer Usage

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI ...2.0015

NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE ...2.0016

THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018

DROUTH PROBABILITIES IN TENNESSEE ...2.0023

SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW RISE BUILDINGS - COLORADO ...3.0016

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042

QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS ...3.0066

ADAP - A COMPUTER PROGRAM FOR STATIC AND DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243

SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971 ...3.0246

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA ...3.0264

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS ...3.0282

FIRE MANAGEMENT SYSTEMS ...5.0007

FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA ...5.0018

NATIONAL FIRE DANGER RATING ...5.0027

ALLOCATION MODEL FOR FIREFIGHTING RESOURCES ...5.0035

FOREST FIRE HISTORY - A COMPUTER METHOD OF DATA ANALYSIS ...5.0038

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA ...6.0013

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME 1 - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074

FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075

FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094

INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS ...6.0144

RUNOFF SIMULATION ...6.0156

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168

- WATERSHEDS IN COLORADO ...6.0185  
FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187  
WATER RESOURCES INVESTIGATIONS ...6.0216  
IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS ...6.0218  
MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233  
SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238  
RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270  
WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION ...6.0271  
FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276  
EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282  
ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291  
LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294  
USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS ...6.0298  
FLOOD PLAIN STUDIES-MINNESOTA ...6.0304  
FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305  
CITY OF JACKSON WATER RESOURCES STUDY ...6.0311  
DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316  
STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318  
STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348  
FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349  
FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365  
INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366  
INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371  
EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374  
URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
ESTUARINE-TYPHOON DYNAMICS OF TAMPA BAY ...8.0027  
HURRICANE-TYPHOON DYNAMICS ...8.0063  
STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072  
COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY ...8.0086  
CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088  
GRAPHICAL DISPLAY OF HURRICANE FORECASTS ...8.0090  
EXTENDING THE COMPUTERIZED TYPHOON/TROPICAL STORM PREDICTION PROGRAM (TYPHOON 72) TOWARD SEVEN DAYS ...8.0105  
TROPICAL STORM SURGE FORECASTING ...8.0109  
SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS ...8.0110  
LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057  
DEVELOP METHODS FOR PREDICTING THE COMPONENTS OF GROUND MOVEMENT ABOVE MINE WORKINGS ...10.0005  
CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA ...10.0032  
SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023  
STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA ...12.0034  
TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA ...13.0011  
LONG-PERIOD WAVES AND SURGES ...13.0019  
THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL ...13.0026  
TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY ...13.0028  
THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA ...14.0008  
COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES ...15.0026  
ASSESSMENT OF RESEARCH ON NATURAL HAZARDS ...16.0028  
EMERGENCY EQUIPMENT STANDARDS ...16.0042  
A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE ...16.0047  
FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1973 ...16.0069  
METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER ...16.0105

*See Mechanics of Structures*

## **Condensation Physics**

*See Meteorology*  
*Meteorological Condensation*

## **Conduits**

*See Hydraulics*

## **Congestion**

*See Transportation Engineering*  
*Traffic Engineering*

## **Conjunctive Use**

*See Water Supply*

## **Conservation**

*See Soil Science and Mechanics*  
*See Water Supply*

## **Consolidation Test**

*See Soil Science and Mechanics*  
*Techniques and Instrumentation*

## **Construction**

*See Buildings & Land Development*  
*See Hydraulics*  
*See Transportation Engineering*

## **Construction Industry**

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY -  
HURRICANE PROTECTION PROJECT ...8.0032

NEW LONDON HURRICANE PROTECTION PROJECT,  
NEW LONDON, CONNECTICUT ...8.0037

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

EROSION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA-  
BLE SOILS IN THREE SMALL WESTERN OREGON  
WATERSHEDS ...15.0034

*See Techniques and Instrumentation*  
*Surveying Methods*

## **Continental Shelf**

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL  
MARGIN - ALASKA ...3.0131

OPERATION AGNES ...8.0135

MONTEREY BAY - CALIFORNIA ...9.0030

TSUNAMI RESEARCH ...13.0005

EVALUATION OF LONG PERIOD SURFACE WAVES IN  
THE GULF OF ALASKA ...13.0012

SAN FRANCISCO BAY ...15.0013

## **Continental Shelves**

*See Oceanography*  
*Marine Geology*

## **Continental Slopes**

*See Oceanography*  
*Marine Geology*

## **Control and Protection**

*See Water Resources Management*

## **Control Devices**

*See Mechanical Power & Equipment*

## **Control Systems**

*See Information Systems Research*  
*Control Theory*

## **Control Theory**

*See Information Systems Research*

## **Convection**

*See Meteorology*

*See Techniques and Instrumentation*

*See Engineering Mechanics*  
*Mechanical Vibrations*

## Correlation

## Cover Crops

*See Stratigraphy*

*See Soil Science and Mechanics*

## Corrosion, Deterioration

## Credit

COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE  
PROTECTION FOR EARTH EMBANKMENTS ...9.0025

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
... 15.0001

*See Economics*  
*Income Analysis*

## Cost Analysis

## Creep

*See Economics*  
*See Information Systems Research*  
*Economic Theory*

*See Geomorphology*  
*Mass Wasting*

## Cost Financing

## Creep and Rheology

*See Buildings & Land Development*  
*Construction*

*See Soil Science and Mechanics*  
*Mechanical Properties*

## Cost-benefit Analysis

## Criminology

*See Economics*  
*Cost Analysis*

*See Social Sciences*

## Counties

## Crushed Rock

SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EF-  
FECTS ...6.0003

*See Economic Geology*  
*Non-metallic Deposits*

STUDIES IN CONNECTION WITH HYDROLOGIC AND RE-  
LATED PHYSICAL PROCESSES IN THE OLYMPUS  
COVE AREA OF SALT LAKE COUNTY ...6.0031

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
ILLINOIS ...6.0260

*See Geochemistry*  
*See Structural Geology*  
*Tectonic Features*

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
LINN COUNTY, IOWA ...6.0280

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR  
REVISION AND EXPANSION ...6.0330

## Crustal History

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY,  
NEW YORK STATE ...6.0333

*See Stratigraphy*  
*Geologic History*

## Crust

*See Geophysics*  
*Geophysical Instrumentation*

## **Crystalline Rocks**

*See Igneous Rocks*

## **Culverts**

*See Hydraulics*

## **Cuts**

*See Soil Science and Mechanics*  
*Earth Structures*

## **Cyclones - Anticyclones**

*See Meteorology*  
*Atmosphere Disturbance*

## **Daily Discharge**

*See Hydraulics*  
*Discharge*

## **Dam Sites**

*See Geomorphology*  
*Engineering Geology*

## **Damage Losses**

*See Recreation*

## **Damping**

*See Engineering Mechanics*  
*Mechanical Vibrations*

## **Dams**

*See Hydraulics*  
*Soil Science and Mechanics*  
*Earth Structures*

*See Techniques and Instrumentation*

## **Data Analysis**

*See Techniques and Instrumentation*

## **Data Networks**

*See Techniques and Instrumentation*  
*Data Acquisition*

## **Data Reduction and Analysis**

*See Information Systems Research*

## **Deep Submersibles**

*See Oceanography*  
*Oceanographic Instrumentation*

## **Deflection**

*See Engineering Mechanics*

## **Deformation**

*See Engineering Mechanics*  
*See Soil Science and Mechanics*  
*Mechanical Properties*  
*See Structural Geology*  
*Tectonics*

## **Deltas**

EFFECTS OF HURRICANE CAMILLE ON THE LAND-  
SCAPE OF THE BRETON-CHANDELEUR ISLAND  
CHAIN AND THE EASTERN PORTION OF THE LOWER  
MISSISSIPPI DELTA ...8.0008

MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971  
- A REPORT TO THE ADMINISTRATOR ...12.0015

## **Demand**

*See Economics*  
*Income Analysis*

## **Demography**

*See Social Sciences*

*See Forestry*

*See Sedimentology*

## **Density**

*See Soil Science and Mechanics*  
*Physical Properties*

## **Diffusion Flame**

*See Fire Research*

## **Depositional Features**

*See Glaciology*  
*Glacial Features*

## **Dikes**

*See Hydraulics*

## **Depth**

*See Oceanography*  
*Sea Water Properties*  
*See Water Quality*  
*Water Properties*

## **Dimensional Effect**

*See Engineering Mechanics*

## **Direct Shear and Plane Shear**

*See Soil Science and Mechanics*  
*Techniques and Instrumentation*

## **Desalination**

*See Water Quality*  
*Water Quality Control*

## **Disaster**

*See Stress - Behavioral Aspects*

## **Deserts**

ARIZONA EARTH FISSURE INVESTIGATION ...10.0014  
DUST DEVIL METEOROLOGY ...12.0036

## **Disaster Preparedness**

*See Economics*  
*Cost Analysis*

## **Design**

*See Buildings & Land Development*  
*See Hydraulics*  
*See Transportation Engineering*

## **Discharge**

*See Hydraulics*

## **Detection & Measurement**

*See Air Pollution*

## **Dispersion - Transport**

*See Air Pollution*  
*Meteorological Aspects*

## **Detection, Warning**

*See Fire Research*  
*Fire Control*

## **Disposal**

*See Solid Waste Management*

## **Detectors**

*See Electronic Systems*

## **Diversion Channels**

*See Hydraulics*

- ALABAMA ...6.0034
- DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO ...6.0046
- FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048
- FLOOD FLOWS FROM SMALL DRAINAGE AREAS ...6.0058
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO ...6.0059
- PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO ...6.0063
- FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI ...6.0065
- RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068
- CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074
- FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075
- BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS ...6.0084
- LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085
- DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970 ...6.0087
- GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV) ...6.0096
- PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J. ...6.0127
- AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132
- WATER RELATED ENVIRONMENTAL SERVICES ...6.0133
- EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134
- EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135
- EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136
- FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161
- DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SUMMARY REPORT ...6.0181
- PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT ...6.0210
- FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215
- WATER RESOURCES INVESTIGATIONS ...6.0216
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222
- MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233
- A PROGRAM FOR METROPOLITAN WATER MANAGEMENT ...6.0243
- FLOOD FREQUENCY STUDY ILLINOIS ...6.0256
- A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260
- STREAMFLOW VARIABILITY - ILLINOIS ...6.0263
- SMALL STREAMS FLOOD FREQUENCY IN MAINE ...6.0287
- URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV) ...6.0308
- DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316
- HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317
- HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319
- FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327
- STREAMS AND DRAINAGE BASINS - FULTON COUNTY, NEW YORK ...6.0329
- PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330
- COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332
- URBAN RUNOFF ...6.0339
- DRAINAGE STUDY - INVENTORY AND ANALYSIS ...6.0340
- EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342
- EFFECTS OF URBANIZATION ON FLOODS AT MORRISTON, NORTH CAROLINA ...6.0343
- URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372
- EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA ...6.0376
- URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383

URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS  
...6.0389

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL  
SYSTEM RELATED TO DRAINAGE PROBLEMS OF  
URBAN AREAS ...6.0390

URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX  
COUNTY, VIRGINIA ...6.0401

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II)  
...6.0407

WATER DRAINAGE FROM IN-PLACE FILLS TO  
PREVENT OR HALT FILL ...9.0013

DEFORMATION CHARACTERISTICS OF HILL SLOPES &  
CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS  
DEPICTED BY REMOTE SENSOR RETURNS - CALIFOR-  
NIA ...9.0036

STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

REMOTE SENSING, ALFAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

### **Drainage Density -texture**

*See Geomorphology*  
*Streams*

### **Drainage Structure**

*See Hydraulics*

### **Dredging**

*See Hydraulics*

### **Drifting Snow**

*See Glaciology*  
*Snow Studies*

### **Drilling**

*See Techniques and Instrumentation*

### **Drought**

*See Meteorology*

### **Dynamic**

*See Engineering Mechanics*  
*Forces and Loadings*

*See Hydraulics*  
*Dams*

### **Earth Structures**

*See Soil Science and Mechanics*

### **Earth Tides**

*See Geophysics*  
*Seismology*

### **Earthquake-type**

*See Buildings & Land Development*  
*Construction*

### **Earthquakes**

*See Geophysics*  
*Seismology*

### **Easements - Right of Way**

*See Law & Water*  
*Water Rights*

### **Ecology**

#### **AQUATIC PLANTS**

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

#### **BIOMES, TERRESTRIAL**

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

#### **ECOLOGY - SPECIALIZED FIELDS**

MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER  
BASIN, MERAMEC RIVER, MISSOURI ...6.0320

#### **HABITAT STUDIES**

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA  
...6.0033



WATERSHED BUTLER AND CHASE COUNTIES ...6.0195  
UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
...6.0196  
HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408  
OPERATION AGNES ...8.0135

#### NICHES

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

#### POPULATION DISTRIBUTION

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021  
HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067  
STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070  
SAN FRANCISCO BAY ...15.0013

#### POPULATION DYNAMICS

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021  
STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

#### Ecology and Morphology

*See Forestry  
Silviculture*

#### Economic Geology

##### GEOLOGICAL EXPLORATION

MONTEREY BAY - CALIFORNIA ...3.0116  
REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...9.0001  
REGIONAL VOLCANOLOGY - WESTERN UNITED  
STATES INCLUDING ALASKA AND HAWAII ...14.0014

##### METALLIC ORES

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...9.0001  
ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033  
HAMILTON 2 DEGREE ...9.0048

EASTERN SNAKE RIVER PLAIN REGION INVESTIGA-  
TIONS - IDAHO ...14.0011  
ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS  
COASTAL ZONE, GALVESTON-HOUSTON AREA  
...16.0104  
*Potential of Deposit*  
RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100  
EARTHQUAKE HAZARDS REDUCTION-NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128  
TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL  
MARGIN - ALASKA ...3.0131  
HAMILTON 2 DEGREE ...9.0048

#### Resource Inventories

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194  
ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033  
SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013

#### MINING STUDIES

RE-DRAFT OF SEEKONK ZONING BY LAW, 15  
NOVEMBER 1969 ...6.0295  
THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSJON AREA,  
PENNSYLVANIA ...6.0357  
REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

#### Mine Engineering

COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004  
MICROSEISMIC DETERMINATION OF COAL MINE  
ENTRY STABILITY ...10.0006  
ROCK MECHANICS STUDY OF SHORTWALL MINING -  
KENTUCKY ...10.0007  
DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME  
DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE  
...10.0022

#### Mine Safety

LOCATION OF SLOPE FAILURE PLANES ...9.0009  
COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004  
DEVELOP METHODS FOR PREDICTING THE COM-  
PONENTS OF GROUND MOVEMENT ABOVE MINE  
WORKINGS ...10.0005  
MICROSEISMIC DETERMINATION OF COAL MINE  
ENTRY STABILITY ...10.0006

DEVELOP DESIGN CRITERIA FOR MINING  
DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE  
...10.0022

MEASUREMENT AND EVALUATION OF SUBSIDENCE  
OVER A COAL MINE WITH VARYING OVERBURDEN  
THICKNESS ...10.0024

RETURNING UNDERGROUND COAL MINE WASTES TO  
MINED-OUT VOIDS ...10.0026

#### *Mine Types*

RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A  
REVIEW OF PRACTICES AND PROCEDURES ...9.0008

RETURNING UNDERGROUND COAL MINE WASTES TO  
MINED-OUT VOIDS ...10.0026

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...10.0031

#### *Mine Wastes*

RETURNING UNDERGROUND COAL MINE WASTES TO  
MINED-OUT VOIDS ...10.0026

#### *Mining Methods*

MICROSEISMIC DETERMINATION OF COAL MINE  
ENTRY STABILITY ...10.0006

ROCK MECHANICS STUDY OF SHORTWALL MINING -  
KENTUCKY ...10.0007

#### *Non-Metallic Deposits*

##### *Coal*

BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME I ...6.0015

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA ...6.0357

COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004

MICROSEISMIC DETERMINATION OF COAL MINE  
ENTRY STABILITY ...10.0006

ROCK MECHANICS STUDY OF SHORTWALL MINING -  
KENTUCKY ...10.0007

MEASUREMENT AND EVALUATION OF SUBSIDENCE  
OVER A COAL MINE WITH VARYING OVERBURDEN  
THICKNESS ...10.0024

RETURNING UNDERGROUND COAL MINE WASTES TO  
MINED-OUT VOIDS ...10.0026

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...10.0031

##### *Crushed Rock*

DENVER METROPOLITAN AREA, COLORADO ...9.0042

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY

HAMILTON 2 DEGREE ...9.0048

#### *Natural Gas*

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...9.0001

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

#### *Oil*

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039

MONTEREY BAY - CALIFORNIA ...3.0116

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL  
MARGIN - ALASKA ...3.0131

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

#### *Phosphate*

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033

#### *Salt*

DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME  
DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE  
...10.0022

#### *Sands and Gravels*

MONTEREY BAY - CALIFORNIA ...3.0116

RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A  
REVIEW OF PRACTICES AND PROCEDURES ...9.0008

ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN  
STUDY FOR THE CITY OF GLENDORA, CALIFORNIA  
...9.0026

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033

DENVER METROPOLITAN AREA, COLORADO ...9.0042

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

#### *Thermal Waters*

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...14.0012

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013

REGIONAL GEOLOGIC FRAMEWORK -

# APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351

## *Fluid Migration*

RANGELY - CALIFORNIA ...3.0123

## *Fluid Properties*

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA ...3.0264

## *Recovery - Production*

LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011

## *Reservoir Characteristics*

RANGELY - CALIFORNIA ...3.0123

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA ...3.0131

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015

## **Economics**

### *See Also Transportation Engineering*

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073

STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV) ...6.0092

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154

LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE CONNECTICUT RIVER FLOOD PLAINS ...6.0293

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294

THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT ...6.0302

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383

URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384

PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV) ...6.0175

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258

RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259

ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273

FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398

ESTIMATING CROP LOSSES DUE TO HAIL STATISTICAL SUPPLEMENT TO AGRICULTURAL ECONOMIC REPORT NO. 267 ...7.0001

MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE ...7.0002

SOYBEAN PHYSIOLOGY AND MANAGEMENT ...7.0004

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0005

WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0007

LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...14.0013

MANAGEMENT OF INSURABLE RISK ...16.0021

A COMPARATIVE ANALYSIS OF PUBLIC SUPPORT OF AND RESISTANCE TO WEATHER MODIFICATION PROJECTS ...16.0061

## **COST ANALYSIS**

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

METHODOLOGY AND PILOT APPLICATION ...3.0230

MECHANISMS OF WILDLAND FIRE SUPPRESSION ...5.0024

DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO ...6.0046

A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101

DESIGN OF OPTIMAL PRECIPITATION NETWORKS ...6.0107

FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS ...6.0120

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA ...6.0137

APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES ...6.0164

STANDARDS FOR PLANNING WATER AND LAND RESOURCES ...6.0223

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291

COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN ...6.0346

GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV) ...8.0011

BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO ...8.0106

ASSESSMENT OF RESEARCH ON NATURAL HAZARDS ...16.0028

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0038

#### *Agricultural Costs*

REDUCING FIRE HAZARD IN PONDEROSA PINE THINNING SLASH BY MECHANICAL CRUSHING - OREGON ...5.0037

MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE ...7.0002

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0005

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0007

MANAGEMENT OF INSURABLE RISK ...16.0021

#### *Budgets and Accounting*

EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES ...16.0022

#### *Cost-benefit Analysis*

COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION ...3.0008

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229

MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA ...6.0027

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND

FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN ...6.0105

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS ...6.0324

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0007

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025

NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS ...16.0030

#### *Disaster Preparedness*

STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A ...3.0002

PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973 ...3.0007

BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0009

OBSERVATIONS OF DAMAGE TO GLENDALE SWIMMING POOLS, MOBILE HOMES, AND COMMERCIAL BUILDINGS RESULTING FROM SAN FERNANDO EARTHQUAKE OF 1971 ...3.0015

REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV) ...3.0022

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS ...3.0161

A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA ...3.0162

TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES ...3.0186

REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES ...3.0200

EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA ...6.0013

A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES ...6.0016

THE METEOROLOGICAL AND HYDROLOGICAL ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS ...6.0022

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK HAVEN, PENNSYLVANIA ...6.0024

MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA ...6.0025

MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA ...6.0027

KINGSTON DISASTER URBAN RENEWAL PROJECTS

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236

SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238

NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973 ...6.0253

FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY ...6.0286

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA ...6.0399

ESTIMATING CROP LOSSES DUE TO HAIL STATISTICAL SUPPLEMENT TO AGRICULTURAL ECONOMIC REPORT NO. 267 ...7.0001

SOYBEAN PHYSIOLOGY AND MANAGEMENT ...7.0004

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0007

APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION ...8.0006

COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS ...10.0001

THE FEDERAL RESPONSE TO TROPICAL STORM AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF ...16.0005

PUBLIC HEALTH SERVICE DISASTER ASSISTANCE REPORT JULY 1967-JUNE 1970 ...16.0011

RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID ...16.0019

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025

NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS ...16.0030

REPORT TO THE CONGRESS - DISASTER PREPAREDNESS ...16.0077

#### ECONOMIC METHODS

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

#### ECONOMIC THEORY

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397

APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION ...8.0006

#### INCOME ANALYSIS

##### *Credit*

RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID ...16.0019

##### *Demand*

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067

##### *Federal Programs*

CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...6.0007

##### *Fiscal Studies*

BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0009

THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332

##### *Government Expenditures*

REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV) ...3.0022

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK HAVEN, PENNSYLVANIA ...6.0024

THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101

PRIORITY AND PLANNING ELEMENTS FOR DEVELOPING ILLINOIS WATER RESOURCES ...6.0262

### *Income Development*

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018

WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS ...6.0036

NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA ...6.0178

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY ...6.0200

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260

FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY ...6.0286

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE ...6.0333

MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN ...6.0363

OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380

DENVER METROPOLITAN AREA, COLORADO ...9.0042

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...16.0075

### *Income Distribution*

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS ...6.0324

### *Insurance*

FLOOD INSURANCE STUDY ...6.0006

CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...6.0007

EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA ...6.0013

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE ...7.0002

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0005

TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY ...13.0028

MANAGEMENT OF INSURABLE RISK ...16.0021

### *National Income*

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

### *Public Income Planning*

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017

### *Regulatory Legislation*

MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA ...6.0027

REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226

FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY ...6.0286

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332

DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973 ...6.0354

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397

### *Taxes*

THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS ...6.0324

### *Industrial Sector*

REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV) ...3.0022

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239

### *Land Use and Development*

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

SAN Geronimo PASS, CALIFORNIA GENERAL PLAN  
TECHNICAL REPORT ...6.0042

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN  
DEVELOPMENT - PART I - LAND USE PLANNING AND  
BENEFIT EVALUATION ...6.0174

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
DRAINAGE AREAS IN FLORIDA ...6.0233

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RE-  
SIDENT ATTITUDES AND PERCEPTIONS AND THEIR  
IMPLICATIONS TO FLOOD PLAIN MANAGEMENT  
POLICY ...6.0239

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES,  
MACON COUNTY, ILLINOIS ...6.0258

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
ILLINOIS ...6.0260

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY  
...6.0286

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUC-  
TION ALTERNATIVES IN THE MINNESOTA RIVER  
BASIN ...6.0300

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE  
WATER RESOURCES POLICIES IN MINNESOTA  
...6.0306

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS-  
SOURI ...6.0319

MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOP-  
MENT PLAN ...6.0363

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS  
AND COSTS OF FLOOD PLAIN REGULATION - VIR-  
GINIA ...6.0397

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...9.0043

COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GAL-  
VESTON AREA, TEXAS ...10.0001

#### NATURAL RESOURCES ECONOMICS

ECONOMIC EVALUATION OF USE AND DEVELOPMENT  
OF WATER AND LAND RESOURCES ...2.0017

IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237

SYNTHESIZING A PROCEDURE FOR FORMULATING  
URBAN FLOOD CONTROL PROGRAMS ...6.0238

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES  
- AN APPROACH TO FLOOD PLAIN MANAGEMENT  
...6.0257

PRIORITY AND PLANNING ELEMENTS FOR DEVELOP-  
ING ILLINOIS WATER RESOURCES ...6.0262

...6.0306

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS  
...6.0324

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379

OSO CREEK TECHNICAL ASSISTANCE STUDY -  
PRELIMINARY STUDY ON THE PROBLEMS AND OP-  
PORTUNITIES FOR DEVELOPMENT OF OSO CREEK  
AND OSO BAY ...6.0380

#### PRODUCTION AND PROCESSING

##### *Management*

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF  
SUPPRESSING HAIL ...7.0005

GRANT TO DESIGN A REBUILDING PLAN FOR GULF-  
PORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF  
HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV)  
...8.0011

##### *Optimization and Feasibility*

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

NATURAL DISASTERS - SOME EMPIRICAL AND  
ECONOMIC CONSIDERATIONS ...16.0030

##### *Risk & Entrepreneur Decisions*

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS  
...6.0324

MANAGEMENT OF INSURABLE RISK ...16.0021

#### PROJECTIONS AND FORECASTS

GLENDORA, CALIFORNIA, GENERAL PLAN 1990  
...6.0170

PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMA-  
RY REPORT ...6.0385

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, AND COSTS OF GEOLOGIC  
HAZARDS AND RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...16.0025

#### REAL ESTATE SECTOR

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK  
HAVEN, PENNSYLVANIA ...6.0024

## Economics

### REGIONAL ECONOMICS

- NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE ...2.0016
- ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017
- COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION ...3.0008
- CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...6.0007
- URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018
- DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO ...6.0046
- PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119
- IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237
- RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259
- DRAINAGE STUDY - INVENTORY AND ANALYSIS ...6.0340
- WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379
- PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397
- IMPACT OF THE LUBBOCK STORM ON REGIONAL SYSTEMS - TEXAS ...12.0040
- ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT ...16.0054
- PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...16.0075

### RETAIL SECTOR

- APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION ...8.0006

### SIMULATION

- OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102
- AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066
- CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA

- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174
- ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291
- DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367
- PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397
- CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA ...10.0032

### SITE LOCATION FACTORS

- SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197
- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174

### TECHNOLOGICAL DEVELOPMENT

- MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

### TRENDS AND CYCLES

- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174

### WATER RESOURCES ECONOMICS

- STUDY OF SEAWATER DESALTING AS EMERGENCY WATER SUPPLY FOR NEW YORK CITY ...2.0001
- A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES ...6.0016
- REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD ...6.0052
- A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080
- DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970 ...6.0087
- THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101
- FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN ...6.0105
- PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J. ...6.0127
- ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151
- A PROGRAM FOR METROPOLITAN WATER RESOURCES



THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

DETERMINATION OF COST-EFFECTIVE TECHNICAL  
PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN  
MANAGEMENT PROGRAM ...6.0347

WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379

#### WELFARE ECONOMICS

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN  
METROPOLITAN AREAS ...3.0229

IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237

ASSESSMENT OF RESEARCH ON NATURAL HAZARDS  
...16.0028

#### Education and Training

EARTHQUAKE SAFETY OF SCHOOL BUILDINGS ...3.0075

RESEARCH AND DEVELOPMENT OF FIRE PREVENTION  
TECHNOLOGY (FIRE PREVENTION) ...5.0017

FIRE PREVENTION - CALIFORNIA ...5.0025

NORTH RICHMOND - SAN PABLO BAY AREA STUDY -  
CALIFORNIA ...6.0178

DEVELOPMENT OF TRAINING PROGRAM FOR EMER-  
GENCY MEDICAL SERVICE PROGRAM ADMINISTRA-  
TION ...16.0003

BODY RECOVERY DOG ...16.0008

TRAINING PROGRAM FOR CRISIS INTERVENORS  
...16.0020

DEVELOPMENT OF IMPROVED EMERGENCY OPERA-  
TIONS SIMULATION TRAINING (EOST) TRAINING  
PROCEDURES ...16.0060

#### Educational Facilities

*See Buildings & Land Development*  
*Building Classification*

#### Effluents - Waste Water

*See Water Quality*  
*Pollution Sources*

#### Elastic Wave Propagation

*See Engineering Mechanics*

#### Elasticity - Inelasticity

*See Structural Geology*  
*Rock Mechanics*

#### Electric Logging Methods

*See Geophysics*  
*Electrical Properties*

#### Electric Power Plants

THE DETERMINATION OF THE FREQUENCY OF  
DROUGHT FLOWS OF VARYING DEGREES OF SEVERI-  
TY AND DURATION - NEW JERSEY ...2.0018

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

GLEN CANYON AND AUBURN DAM SEISMICITY  
COLORADO ...3.0166

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL  
REPORT, FISCAL YEAR 1971 ...6.0227

DETERMINATION OF DECISION MAKING PROCESSES IN  
WATER RESOURCE PLANNING AND DEVELOPMENT  
THE CONNECTICUT RIVER BASIN ...6.0292

DEVELOPMENT OF WATER RESOURCE MANAGEMENT  
METHODS - TENNESSEE ...6.0367

GALVESTON BAY HURRICANE SURGE - REPORT 2. EF-  
FECTS OF PROPOSED BARRIERS ON TIDES, CUR-  
RENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
...8.0038

REGULATION OF GREAT LAKES WATER LEVELS - A  
SUMMARY REPORT/1974 ...16.0040

METROPOLITAN WATER SYSTEM OPERATION SUB-  
SEQUENT TO NUCLEAR ATTACK OR NATURAL DIS-  
ASTER ...16.0105

#### Electric Power Systems

##### ELECTRIC POWER DISTRIBUTION

RESPONSE OF POWER SYSTEMS TO THE SAN FERNAN-  
DO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971  
...3.0023

##### ELECTRICAL ENGINEERING

RESPONSE OF POWER SYSTEMS TO THE SAN FERNAN-  
DO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971  
...3.0023

EMERGENCY POWER GENERATION	OPTIMUM UTILIZATION OF GOVERNMENT COMMUNICATIONS RESOURCES ...16.0037
RESPONSE OF POWER SYSTEMS TO THE SAN FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0023	DISASTER WARNING SATELLITE STUDY ...16.0048
PROVIDING ELECTRIC POWER FROM INDUCTION GENERATORS DURING PROLONGED POWER OUTAGES ...16.0027	<i>Satellite Communication</i>
	SEARCH AND RESCUE COMMUNICATION--GLOBAL RESCUE ALARM NET (GRAN) ...16.0010
	<i>Space Communication</i>
Electrical Engineering	SEARCH AND RESCUE COMMUNICATION--GLOBAL RESCUE ALARM NET (GRAN) ...16.0010
<i>Electric Power Systems</i>	<i>Telecommunication Networks</i>
Electrical Properties	A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I - SUMMARY - MAIN STUDY RECOMMENDATIONS AND FINDINGS ...5.0010
Geophysics	NATIONAL SEARCH AND RESCUE TELECOMMUNICATION SYSTEM PLAN (PINSARS) ...16.0032
Electromagnetic Probing	<i>Telemetry</i>
<i>Geophysics</i>	AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129
<i>Electrical Properties</i>	HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104
Electromagnetic Radiation	<i>Weather Communication</i>
<i>Techniques and Instrumentation</i>	A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE ...16.0047
<i>Remote Sensing</i>	
Electronic Systems	DETECTORS
ANTENNAS	AIRBORNE INFRARED FOREST FIRE DETECTION SYSTEM ...5.0028
DEPENDENT AM AND FM BROADCAST ANTENNAS ...16.0107	TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA ...13.0011
COMMUNICATION SYSTEMS	MARINE NAVIGATION SYSTEMS
<i>Emergency Communication</i>	MICROWAVE METEOROLOGY ...8.0104
EVALUATION OF EMERGENCY CALL SYSTEMS ...16.0031	MICROWAVE TECHNIQUES
PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM SERVING THE EMERGENCY SERVICE DEPARTMENTS OF THE CITY OF LOS ANGELES (ABBREV) ...16.0036	MICROWAVE METEOROLOGY ...8.0104
<i>Global Communication</i>	REMOTE CONTROL SYSTEMS
SEARCH AND RESCUE COMMUNICATION--GLOBAL RESCUE ALARM NET (GRAN) ...16.0010	WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011
<i>Radio Communication</i>	HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104
A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I - SUMMARY - MAIN STUDY RECOMMENDATIONS AND FINDINGS ...5.0010	

CROWAVE METEOROLOGY ...8.0104

DEVELOPMENT OF A DISTRESS ALERTING AND  
LOCATING SYSTEM (DALS) FOR SEARCH AND  
RESCUE MISSION ...16.0015

NATIONAL SEARCH AND RESCUE TELECOMMUNICA-  
TION SYSTEM PLAN (PINSARS) ...16.0032

#### *Infrared Systems*

DETECTION OF CENTERS OF COMBUSTION OF  
SMALL DIMENSIONS BY THE METHOD FOR IR  
PHOTOGRAPHY ...5.0030

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

#### *Radio Detection Systems*

SEARCH AND RESCUE COMMUNICATION--GLOBAL  
RESCUE ALARM NET (GRAN) ...16.0010

#### *Remote Sensing Systems*

MONITORING FLOOD DAMAGE WITH SATELLITE  
IMAGERY ...6.0030

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

#### *SIGNAL ANALYSIS*

AUTOMATIC MICROEARTHQUAKE PROCESSING  
CALIFORNIA ...3.0129

MONITORING FLOOD DAMAGE WITH SATELLITE  
IMAGERY ...6.0030

#### *TESTING FACILITIES*

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

#### *WARNING SYSTEMS*

HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM  
SYSTEM ...6.0104

GLOBAL RESCUE ALARM NETWORK (GRAN) ...16.0009

SEARCH AND RESCUE COMMUNICATION--GLOBAL  
RESCUE ALARM NET (GRAN) ...16.0010

DEVELOPMENT OF A DISTRESS ALERTING AND  
LOCATING SYSTEM (DALS) FOR SEARCH AND  
RESCUE MISSION ...16.0015

NATIONAL SEARCH AND RESCUE TELECOMMUNICA-  
TION SYSTEM PLAN (PINSARS) ...16.0032

IMPROVED OUTDOOR ALERTING AND WARNING  
...16.0039

DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
...16.0047

SELECTIVE ANALYSIS ...16.0099

### **Embankments**

*See Soil Science and Mechanics*  
*Earth Structures*

### **Emergency Communication**

*See Electronic Systems*  
*Communication Systems*

### **Emergency Non-hospital Service**

*See Public Health*  
*Community Health Services*

### **Emergency Power Generation**

*See Electric Power Systems*

### **Emergency Service**

*See Hospital & Medical Facilities*  
*Hospital Services & Units*

### **Emergency Vehicles**

*See Transportation Engineering*  
*Transportation Systems*

### **Energy Conversion**

APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA ...6.0351

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE  
JAMES RIVER - VIRGINIA ...6.0396

ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS  
COASTAL ZONE, GALVESTON-HOUSTON AREA  
...16.0104

#### *ENVIRONMENTAL ASPECTS*

SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW  
RISE BUILDINGS - COLORADO ...3.0016

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

#### *FOSSIL FUELS*

WATER ...3.0100

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243

SUBSIDENCE AND RELATED ASPECTS OF GEOTHERMAL SYSTEMS ...10.0017

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA ...14.0008

EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...14.0011

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO ...14.0012

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...14.0013

REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII ...14.0014

#### *Hydroelectric Power*

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA ...6.0033

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME 1 - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367

#### *Solar Energy*

STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER ...2.0004

#### *Windpower*

STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER ...2.0004

#### *Nuclear Energy*

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES ...3.0056

SEISMIC RESEARCH ...3.0225

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA ...16.0055

#### *Energy Dissipators*

*See Mechanical Power & Equipment  
Control Devices*

#### *Energy Loss*

*See Hydraulics*

## **Engineering Geology**

*See Geomorphology*

## **Engineering Mechanics**

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

DESIGN CRITERIA FOR MASONRY ...3.0194

#### *ANALYSIS*

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS ...3.0036

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS ...3.0041

NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS ...3.0078

GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079

INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211

#### *Elastic*

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085

OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES ...8.0102

#### *Graphical*

SHEAR MODULUS AND DAMPING IN SOILS - DESIGN EQUATIONS AND CURVES ...3.0216

#### *Plastic*

ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES ...8.0102

#### *Strain Gauges*

EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005

ELASTOMERIC ENERGY ABSORBER ...3.0152  
 FULL SCALE TEST ON A TWO-STORY HOUSE SUB-  
 JECTED TO LATERAL LOAD ...3.0195  
 SHEAR STRENGTH DECAY IN REINFORCED CONCRETE  
 COLUMNS SUBJECTED TO LARGE DEFLECTION  
 REVERSALS ...3.0214  
 INELASTIC DESIGN OF BUILDING FRAMES TO RESIST  
 EARTHQUAKES ...3.0227

#### DEFORMATION

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY  
 DAMS ...3.0031  
 EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
 DAMS ...3.0066  
 STIFFNESS DEGRADATION OF REINFORCED CONCRETE  
 MEMBERS SUBJECTED TO CYCLIC FLEXURAL MO-  
 MENTS ...3.0073  
 EXPERIMENTAL INVESTIGATION INTO THE SEISMIC  
 BEHAVIOR OF CRITICAL REGIONS OF REINFORCED  
 CONCRETE COMPONENTS AS INFLUENCED BY MO-  
 MENT AND SHEAR ...3.0076  
 NONLINEAR ANALYSIS OF REINFORCED CONCRETE  
 FRAMES AND PANELS ...3.0078  
 CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFOR-  
 MATION OF ENGINEERING MATERIALS ...3.0081  
 INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN  
 SUBASSEMBLAGES ...3.0082  
 CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE  
 (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR  
 ...3.0088  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
 BUILDINGS ...3.0211  
 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUC-  
 TURES ...3.0215  
 INELASTIC DESIGN OF BUILDING FRAMES TO RESIST  
 EARTHQUAKES ...3.0227  
 PROBABILITY OF FATIGUE FAILURE UNDER  
 EARTHQUAKE LOADS ...3.0251

#### DIMENSIONAL EFFECT

MODAL COUPLING AND EARTHQUAKE RESPONSE OF  
 TALL BUILDINGS ...3.0141  
 EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MO-  
 TION ON A REINFORCED CONCRETE COLUMN  
 ...3.0206

MODIFICATION OF SEISMOGRAPH RECORDS FOR EF-  
 FECTS OF LOCAL SOIL CONDITIONS ...3.0093  
 SHEAR STRENGTH DECAY IN REINFORCED CONCRETE  
 COLUMNS SUBJECTED TO LARGE DEFLECTION  
 REVERSALS ...3.0214  
 STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE  
 HAZARDS IN THE UNITED STATES. REPORT I.  
 ...3.0233  
 SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN  
 AND WALL CONNECTIONS ...3.0282

#### FAILURE

BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE  
 SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971  
 ...3.0005  
 LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUC-  
 TURES ...3.0027  
 APPLICATION OF PROBABILITY, STATISTICS AND DEC-  
 ISION THEORY IN SOIL ENGINEERING ...3.0137  
 PROBABILITY OF FATIGUE FAILURE UNDER  
 EARTHQUAKE LOADS ...3.0251  
 SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING  
 SYSTEMS AND COMPONENTS ...3.0265  
 STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
 AS A MECHANISM FOR FAILURE OF MILITARY IN-  
 STALLATIONS ...10.0010

#### FATIGUE

LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUC-  
 TURES ...3.0027  
 PROBABILITY OF FATIGUE FAILURE UNDER  
 EARTHQUAKE LOADS ...3.0251  
 THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO  
 FATIGUE DAMAGE ...3.0274

#### FORCES AND LOADINGS

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN  
 SUBASSEMBLAGES ...3.0082  
 ELASTOMERIC ENERGY ABSORBER ...3.0152

#### *Axial*

STATIC AND EARTHQUAKE ANALYSIS OF THREE-  
 DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS  
 ...3.0099  
 SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
 BUILDINGS ...3.0211

REPAIRED REINFORCED CONCRETE ...3.0084  
 EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA ...3.0094  
 STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099  
 ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE ...3.0148  
 PROBABILISTIC METHODS IN CIVIL ENGINEERING ...3.0208  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211  
 LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING ...3.0234  
 INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE ...3.0273  
 SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS ...3.0278  
 DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279

#### *Impact and Shock*

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS ...3.0010  
 RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014  
 ENGINEERING SEISMOLOGY ...3.0019  
 IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN ...3.0038  
 MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040  
 NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042  
 COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTICAL STRUCTURES BASED ON SEISMOGRAMS FROM THE SAN FERNANDO EARTHQUAKE (ABBREV) ...3.0048  
 COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM ...3.0053  
 APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING ...3.0137  
 FORCED VIBRATION OF A 22-STORY STEEL FRAME BUILDING ...3.0144  
 ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE ...3.0154  
 EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE ...3.0183  
 FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD ...3.0195  
 SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211

#### *Periodic*

SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS ...3.0060  
 STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS ...3.0073  
 CYCLIC LOADING OF FULL-SIZE CONNECTIONS ...3.0089  
 STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS ...3.0205  
 SHEAR MODULUS AND DAMPING IN SOILS - DESIGN EQUATIONS AND CURVES ...3.0216

#### *Random*

STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES ...3.0033  
 ADAPTIVE STRUCTURAL SYSTEMS ...3.0253

#### *Static*

EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES ...3.0037  
 QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058  
 STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099  
 SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211  
 LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING ...3.0234

#### *Transverse*

BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0005  
 QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058  
 DAMAGE PROBABILITY MATRICES FOR PROTOTYPE BUILDINGS ...3.0063  
 NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS ...3.0078

#### *Wind*

THE FORMULATION AND EXPERIMENTAL VERIFICATION OF MATHEMATICAL MODELS FOR PREDICTING DYNAMIC RESPONSE OF MULTISTORY BUILDINGS ...3.0061

HURRICANE EFFECTS ON PORT FACILITIES ...8.0076  
 DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...8.0077  
 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES ...8.0102  
 LUBBOCK TORNADO - A SURVEY OF BUILDING DAMAGE IN AN URBAN AREA - TEXAS ...12.0004  
 WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS ...12.0018  
 NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS ...12.0019

#### Fracture Mechanics

NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS ...3.0078  
 RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS ...3.0084  
 COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION ...15.0001

#### Hysteresis

CYCLIC LOADING OF FULL-SIZE CONNECTIONS ...3.0089

#### Mechanical Vibrations

LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES ...3.0027  
 EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION ...3.0029  
 EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS INCLUDING FOUNDATION INTERACTION ...3.0030  
 DYNAMIC ANALYSIS OF COUPLED SHEAR WALLS AND SANDWICH BEAMS ...3.0045  
 THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087  
 FORCED VIBRATION OF A 22-STORY STEEL FRAME BUILDING ...3.0144  
 DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS ...3.0271  
 FLOW SLIDE CONTROL WITH SLOPE REVETMENTS ...9.0020

#### Coupled

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS ...3.0031  
 MODAL COUPLING AND EARTHQUAKE RESPONSE OF TALL BUILDINGS ...3.0141

MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040  
 DYNAMICS OF BUILDING - SOIL INTERACTION ...3.0043  
 COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM ...3.0053  
 SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS ...3.0060  
 STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047) ...3.0065  
 STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS ...3.0073  
 EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076  
 CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088  
 DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING ...3.0091  
 SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES ...3.0096  
 ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE ...3.0148  
 INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190  
 RESPONSE AND ENERGY-DISSIPATION OF REINFORCED CONCRETE FRAMES SUBJECTED TO STRONG BASE MOTIONS ...3.0210  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211  
 EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212  
 SHEAR MODULUS AND DAMPING IN SOILS - DESIGN EQUATIONS AND CURVES ...3.0216

#### Excitation

STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES ...3.0033

#### Frequency

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040  
 COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM ...3.0053  
 INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE ...3.0083  
 STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT I ...3.0233

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES ...3.0003

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES ...3.0033

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER STRUCTURES SURROUNDED BY WATER ...3.0034

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS ...3.0041

DYNAMICS OF BUILDING - SOIL INTERACTION ...3.0043

QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058

THE FORMULATION AND EXPERIMENTAL VERIFICATION OF MATHEMATICAL MODELS FOR PREDICTING DYNAMIC RESPONSE OF MULTISTORY BUILDINGS ...3.0061

STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047) ...3.0065

STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS ...3.0068

ADAP - A COMPUTER PROGRAM FOR STATIC AND DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079

INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE ...3.0083

ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085

OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090

DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING ...3.0091

SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES ...3.0096

MODAL COUPLING AND EARTHQUAKE RESPONSE OF TALL BUILDINGS ...3.0141

INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190

EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN ...3.0206

EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES ...3.0227

DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL SYSTEMS ...3.0255

MENTS ...3.0073

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076

GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES ...3.0082

RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS ...3.0084

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD ...3.0195

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES ...3.0227

#### MOMENTS

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

#### STABILITY

STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS ...3.0068

SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103

#### STRAIN

NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS ...3.0078

CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO ...3.0127

EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN ...3.0206

#### Elastic

ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE ...3.0154

#### Plastic

ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE ...3.0154

#### Shear

LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES ...3.0027



## STRENGTH

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES ...3.0082

RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS ...3.0084

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

STRENGTH OF EXISTING MASONRY WALLS ...3.0189

INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190

THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE ...3.0274

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS ...3.0282

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION ...15.0001

## STRESSES

ADAP - A COMPUTER PROGRAM FOR STATIC AND DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS ...3.0078

CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFORMATION OF ENGINEERING MATERIALS ...3.0081

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES ...3.0082

ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE ...3.0148

INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190

EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN ...3.0206

EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005

## Bending

STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099

## Compressive

STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS ...3.0205

## External

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211

QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES ...3.0058

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090

SHEAR STRENGTH DECAY IN REINFORCED CONCRETE COLUMNS SUBJECTED TO LARGE DEFLECTION REVERSALS ...3.0214

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS ...3.0282

## Tensile

STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS ...3.0205

## Thermal

SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265

## Engineering Psychology

WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS ...12.0018

## Environmental Geology

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA ...3.0039

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120

PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA ...3.0121

V. A. HOSPITAL SITE EVALUATIONS ...3.0177

SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO ...3.0182

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS IDAHO ...3.0185

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES ...3.0200

DENVER URBAN CORRIDOR STUDIES - COLORADO ...4.0005

DENVER METROPOLITAN AREA, COLORADO ...6.0184

- PREVENT OR HALT FILL ...9.0013
- ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021
- ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLENDORA, CALIFORNIA ...9.0026
- GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA ...9.0029
- MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA ...9.0034
- SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040
- GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA ...9.0041
- URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...10.0003
- EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...14.0011
- ENVIRONMENTAL GEOMORPHIC STUDY OF THE COASTAL REGIMES ALONG THE SOUTH SHORE OF LONG ISLAND - NEW YORK ...15.0027
- ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT ...15.0038
- URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025
- ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT ...16.0054
- GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA ...16.0055
- SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056
- PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...16.0075
- ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COASTAL ZONE, GALVESTON-HOUSTON AREA ...16.0104
- ENVIRONMENTAL HAZARDS
- AVALANCHE STUDIES, 1971-1972 ...1.0001
- ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004
- AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT ...1.0006
- ROCKY MOUNTAINS ...1.0011
- AVALANCHE CONTROL IMPLEMENTATION STUDY ...1.0014
- HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007
- VAN NORMAN RESERVOIRS AREA, CALIFORNIA ...3.0006
- COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION ...3.0008
- BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0009
- EARTHQUAKE - INDUCED EMBANKMENT DISTRESS ...3.0010
- URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...3.0011
- ENGINEERING SEISMOLOGY ...3.0019
- SEISMIC RISK - FDAA - WASHINGTON AND UTAH ...3.0020
- REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA ...3.0039
- MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SWITCHYARD EQUIPMENT ...3.0046
- TSUNAMI RESEARCH ...3.0049
- TETON DAM SEISMICITY - IDAHO ...3.0050
- NATIONAL EARTHQUAKE INFORMATION SERVICE ...3.0051
- EARTHQUAKES RELATED TO RESERVOIR FILLING ...3.0054
- SEISMIC DESIGN OF LOW-RISE BUILDINGS ...3.0059
- EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS ...3.0066
- RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER ...3.0100
- OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102
- MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104
- EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION ...3.0107
- ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109
- INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA ...3.0117
- MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120
- ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...3.0122
- REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124
- SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS ...3.0125

- ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...3.0132
- CALIFORNIA M/EQ NET ...3.0134
- CENTRAL CALIFORNIA SEISMICITY STUDIES  
CALIFORNIA ...3.0135
- STUDY OF MECHANISM OF ACCUMULATION AND  
RELEASE OF TECTONIC STRESS IN CENTRAL  
CALIFORNIA ...3.0138
- EVALUATION OF THE INCREMENTAL SEISMIC RISK  
DUE TO RESERVOIR FILLING ...3.0142
- AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157
- ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159
- RISK MAPS AND FIELD INVESTIGATIONS ...3.0163
- SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS  
UNITED STATES ...3.0164
- VA. SEISMICITY - 32 STATES AND PUERTO RICO  
...3.0165
- GLEN CANYON AND AUBURN DAM SEISMICITY  
COLORADO ...3.0166
- SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168
- GREATER ANCHORAGE AREA BOROUGH, ALASKA  
...3.0172
- ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
OF COASTAL COMMUNITIES, ALASKA ...3.0175
- SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178
- TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES  
IN NEVADA, IN SUPPORT OF EARTHQUAKE CON-  
TROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
...3.0180
- HAMILTON 2 DEGREE ...3.0184
- BUILDING PRACTICES FOR DIASER MITIGATION  
...3.0188
- SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197
- PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...3.0198
- REPORT OF THE TASK FORCE ON EARTHQUAKE  
HAZARD REDUCTION PROGRAM PRIORITIES ...3.0200
- A STUDY OF MICROEARTHQUAKES IN THE  
SOUTHEASTERN UNITED STATES ...3.0202
- PROBABILISTIC METHODS IN CIVIL ENGINEERING  
...3.0208
- EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
BUILDINGS ...3.0211
- EVALUATION OF STRUCTURAL DAMAGE CAUSED BY  
EARTHQUAKE TOWARD THE DEVELOPMENT OF  
EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212
- RESEARCH STUDIES AND REPORTS ON EARTHQUAKE  
HAZARDS REDUCTION ...3.0218
- SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN  
METROPOLITAN AREAS ...3.0229
- EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES  
IN EARTH DAMS ...3.0231
- LARGE SCALE INTEGRATION IN URBAN PLANNING  
WITH APPLICATIONS TO TALL BUILDING PLANNING  
IN REGIONS SUBJECTED TO NATURAL HAZARDS  
...3.0257
- A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262
- SEISMIC HAZARD REGIONALIZATION AND PROBABILI-  
TY OF FUTURE EARTHQUAKES IN THE UNITED  
STATES ...3.0268
- DENVER URBAN CORRIDOR STUDIES - COLORADO  
...4.0005
- PROFILING THE FOREST INCENDIARIST - AN ANALYSIS  
OF DOCUMENTED CASE HISTORIES ...5.0001
- PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
...5.0002
- PHYSICAL CHARACTERISTICS OF CHAMISE AS A WIL-  
DLAND FUEL - CALIFORNIA ...5.0003
- FIRE WEATHER AND FIRE BEHAVIOR AT THE 1968  
CANYON FIRE - CALIFORNIA ...5.0004
- GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA  
MIXED-CONIFER TYPE ...5.0005
- FOREST FIRE BEHAVIOR - CALIFORNIA ...5.0006
- FIRE MANAGEMENT SYSTEMS ...5.0007
- CONTRACT FOR PARTIAL SUPPORT OF THE COMMIT-  
TEE ON FIRE RESEARCH ...5.0008
- EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SER-  
VICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT  
ARGONNE NATIONAL LABORATORY (ABBREV)  
...5.0009
- A STUDY OF FOREST SERVICE TELECOMMUNICATIONS  
- VOLUME I - SUMMARY - MAIN STUDY RECOMMEN-  
DATIONS AND FINDINGS ...5.0010
- THE GREAT OAKLAND, LOS ANGELES, AND SAN  
DIEGO FIRES, SEPTEMBER 22 TO 29, 1970 ...5.0012
- STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA ...5.0013
- FOREST FIRES IN MISSOURI ...5.0015
- FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX  
FIRE - MINNESOTA ...5.0016
- RESEARCH AND DEVELOPMENT OF FIRE PREVENTION  
TECHNOLOGY (FIRE PREVENTION) ...5.0017
- PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPER-  
TIES OF FUELS RELATED TO FIRE PHENOMENA  
...5.0018
- METHODS FOR THE PREVENTION AND CONTROL OF  
LIGHTNING FIRES ...5.0019
- CONTROL AND USE OF FIRE PARTICULARLY IN WIL-  
DERNESS, PARK, AND OTHER RECREATIONAL AREAS  
...5.0020
- A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

NATIONAL FIRE DANGER RATING ...5.0027

AIRBORNE INFRARED FOREST FIRE DETECTION SYSTEM ...5.0028

RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION ...5.0029

THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY ...5.0030

OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA ...5.0031

CORRELATION OF SATELLITE AND GROUND DATA IN AIR POLLUTION STUDIES (ABBREV) ...5.0032

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033

FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034

CHARACTERISTICS OF PEOPLE WHO START FIRES ...SOME PRELIMINARY FINDINGS - CALIFORNIA ...5.0036

REDUCING FIRE HAZARD IN PONDEROSA PINE THINNING SLASH BY MECHANICAL CRUSHING - OREGON ...5.0037

FOREST FIRE HISTORY - A COMPUTER METHOD OF DATA ANALYSIS ...5.0038

PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL ...5.0039

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

FOREST FIRE STATISTICAL PROBLEMS ...5.0041

DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS ...5.0044

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0045

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES ...5.0046

FIRE ON A FOREST SOIL ...5.0047

SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS ...6.0003

EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA ...6.0013

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, &amp; COSTS OF GEOLOGIC HAZARDS &amp; RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...6.0045

INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139

TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN ...6.0143

HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149

FLOODWAY EVALUATIONS BEFORE &amp; AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186

FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187

REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226

GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230

HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALABAMA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

FLOOD INUNDATION STUDY - WISCONSIN ...6.0248

FLOOD PROFILES &amp; FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA ...6.0277

FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA ...6.0278

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282

FLOOD PLAIN STUDIES-MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305

DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, &amp; FLOOD INUNDATION - NEW JERSEY ...6.0326

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344

FLOOD PLAIN INUNDATION ...6.0364  
 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383  
 URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389  
 TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS ...6.0394  
 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400  
 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401  
 FLOOD INUNDATION STUDY, WISCONSIN ...6.0409  
 WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006  
 TRACER STUDIES IN THE NATIONAL HAIL RESEARCH EXPERIMENT (NHRE) ...7.0017  
 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA ...8.0002  
 STORM SURGE RESEARCH ...8.0060  
 REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA ...9.0002  
 LANDSLIDES - KENTUCKY ...9.0015  
 SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019  
 ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021  
 SANTA CRUZ COUNTY COOP ...9.0027  
 GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA ...9.0029  
 MONTEREY BAY - CALIFORNIA ...9.0030  
 MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA ...9.0034  
 REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING ...9.0035  
 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040  
 GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA ...9.0041  
 DENVER METROPOLITAN AREA, COLORADO ...9.0042  
 SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043

DISASTER INVESTIGATIONS ...12.0001  
 NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS ...12.0019  
 TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS ...13.0015  
 RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018  
 VOLCANIC HAZARDS ON THE ISLANDS OF HAWAII ...14.0001  
 HAWAIIAN VOLCANO OBSERVATORY ...14.0004  
 VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON ...14.0007  
 VOLCANIC HAZARDS, ISLAND OF HAWAII ...14.0010  
 EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...14.0011  
 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO ...14.0012  
 SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...14.0013  
 ASSESSMENT OF RESEARCH ON NATURAL HAZARDS ...16.0028  
 COMMUNICATIONS IN NATURAL DISASTERS ...16.0033  
 DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER ...16.0034  
 NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056  
 WEATHER SATELLITE CAPABILITIES - PRESENT AND FUTURE ...16.0067  
 BUILDING PRACTICES FOR DISASTER MITIGATION ...16.0073  
 COLLABORATIVE RESEARCH ON NATURAL HAZARDS ...16.0094

## Environmental Impact

### *See Also Solid Waste Management*

THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018  
 RESPONSE OF POWER SYSTEMS TO THE SAN FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0023  
 MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120  
 MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI ...3.0242  
 DENVER URBAN CORRIDOR STUDIES - COLORADO ...4.0005  
 STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING ERTS DATA - ALASKA ...5.0013  
 LOCK HAVEN URBAN RENEWAL PROJECT, LOCK HAVEN, PENNSYLVANIA ...6.0024

KINGSTON DISASTER URBAN RENEWAL PROJECT,  
BOROUGH OF KINGSTON, LUZERNE COUNTY,  
PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA  
...6.0033

REGULATION OF GREAT LAKES WATER LEVELS RE-  
PORT TO THE INTERNATIONAL JOINT COMMISSION  
BY THE INTERNATIONAL GREAT LAKES LEVELS  
BOARD ...6.0052

HURRICANE CREEK WATERSHED PROJECT,  
HUMPHREYS AND DICKSON COUNTIES, TENNESSEE  
...6.0055

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO  
...6.0079

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMEN-  
TAL RESEARCH PROGRAM - ILLINOIS ...6.0086

GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE  
PROTECTION ASSOCIATED WATER FEATURE, BAYOU  
LAFOURCHE - LOUISIANA (ABBREV) ...6.0096

NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE  
PROTECTION ...6.0097

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY -  
HURRICANE PROTECTION PROJECT ...6.0098

MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN  
AND VICINITY AREA) ...6.0099

RED RIVER EMERGENCY BANK PROTECTION, LOUI-  
SIANA, ARKANSAS, AND TEXAS ...6.0100

HURRICANE PROTECTION PROJECT, STRATFORD, CON-  
NECTICUT ...6.0108

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

ALTERNATE SOLUTIONS TO WATER RESOURCE  
DEVELOPMENT-A CASE STUDY - TEXAS ...6.0151

PORT ARTHUR HURRICANE FLOOD PROTECTION,  
PORT ARTHUR AND VICINITY, TEXAS ...6.0152

LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A  
SUMMARY OF THE WISCONSIN STUDY AND AN  
ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162

PLAN FORMULATION AND EVALUATION IN MULTIPLE  
PURPOSE WATER RESOURCE PROJECT - A  
FRAMEWORK FOR REGIONAL PLANNING (ABBREV)  
...6.0175

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182  
KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES ...6.0195

UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
...6.0196

HOLLOW CREEK WATERSHED PROJECT, SOUTH  
CAROLINA ...6.0197

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

WUTWOOD WATERSHED, ILLINOIS ...6.0199

HURRICANE CREEK WATERSHED STRUCTURAL PRO-  
JECT MEASURE, KENTUCKY ...6.0200

SCRE, NEBRASKA ...6.0203

WHITEWATER CREEK HYDROLOGIC UNIT PROJECT  
MEASURE, CHEROKEE HILLS RC AND D PROJECT,  
OKLAHOMA ...6.0206

ZONING REGULATIONS OF THE CITY OF SARASOTA,  
FLORIDA ...6.0232

IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237

SYNTHESIZING A PROCEDURE FOR FORMULATING  
URBAN FLOOD CONTROL PROGRAMS ...6.0238

THE PEACHTREE CREEK WATERSHED AS A CASE HIS-  
TORY IN URBAN FLOOD PLAIN DEVELOPMENT  
...6.0240

ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
NOFF CHARACTERISTICS - GEORGIA ...6.0244

HAWAII ENVIRONMENTAL SIMULATION MODEL  
...6.0252

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE  
WATER RESOURCES POLICIES IN MINNESOTA  
...6.0306

FORT SCOTT LAKE, MARMATON RIVER, KANSAS  
...6.0315

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY,  
NEW YORK STATE ...6.0333

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...6.0341

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

OSO CREEK TECHNICAL ASSISTANCE STUDY -  
PRELIMINARY STUDY ON THE PROBLEMS AND OP-  
PORTUNITIES FOR DEVELOPMENT OF OSO CREEK  
AND OSO BAY ...6.0380

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011

ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EF-  
FECTS OF TROPICAL STORM AGNES ON THE UPPER  
CHESAPEAKE BAY AND SELECTED TRIBUTARIES  
...8.0009

ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027

OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, MASSACHUSETTS ...8.0035

BENEFITS OF ENVIRONMENTAL PREDICTION IN THE  
EASTERN GULF OF MEXICO ...8.0106

INVESTIGATION OF SHORELINE CHANGES AT SAR-  
GENT BEACH, TEXAS ...8.0128

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

IMPACT OF THE LUBBOCK STORM ON REGIONAL  
SYSTEMS - TEXAS ...12.0040

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013

AND HURRICANE PROTECTION ...15.0007  
 BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE ...15.0010  
 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS ...15.0018  
 NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035  
 SUMMARY REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0045  
 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1975 ...16.0070  
 WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0090

## **Eolian Geomorphic Features**

*See Geomorphology*

## **Epeirogenic Movement -isostasy**

*See Structural Geology  
 Tectonics*

## **Ephemeral Streams**

*See Geomorphology  
 Streams*

## **Epidemiology of Disease**

*See Public Health*

## **Equity**

*See Law & Water  
 Water Rights*

## **Erosion**

*See Also Geomorphology  
 Physiography*

BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014  
 EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS ...5.0022  
 FLOOD PROTECTION AT CULVERT OUTLETS ...6.0050

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085  
 FLOOD MANAGEMENT STUDY ...6.0159  
 FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160  
 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169  
 NUTWOOD WATERSHED, ILLINOIS ...6.0199  
 BIG CREEK WATERSHED, KANSAS ...6.0202  
 VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205  
 WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA ...6.0206  
 LAKE HYDROLOGY ...6.0207  
 THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273  
 HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317  
 SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS ...6.0381  
 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408  
 ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLENDORA, CALIFORNIA ...9.0026  
 EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051  
 FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...15.0002  
 PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESERVOIR SYSTEMS ...15.0008  
 HYDRAULIC EROSION OF SOILS ...15.0012  
 SAN FRANCISCO BAY ...15.0013  
 COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS ...15.0016  
 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS ...15.0018  
 LAKE SHORE EROSION IN ILLINOIS ...15.0020  
 NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION ...15.0021  
 PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN ...15.0025  
 COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES ...15.0026

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF  
LAKE ERIE ...15.0032

EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC  
FACTORS INFLUENCING EROSION OF THE OREGON  
COAST ...15.0033

EROSION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA-  
BLE SOILS IN THREE SMALL WESTERN OREGON  
WATERSHEDS ...15.0034

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLO-  
GY IN THE CENTRAL APPALACHIAN REGION - VIR-  
GINIA ...15.0039

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, AND COSTS OF GEOLOGIC  
HAZARDS AND RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...16.0025

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

### **Erosion Control**

*See Hydraulics*

### **Erosional Features**

*See Geomorphology*  
*Shoreline Geomorphology*  
*See Glaciology*  
*Glacial Features*

### **Estuaries**

THE DETERMINATION OF THE FREQUENCY OF  
DROUGHT FLOWS OF VARYING DEGREES OF SEVERI-  
TY AND DURATION - NEW JERSEY ...2.0018

STUDIES OF THE RED ALGAE IN DISCAYNE BAY  
...6.0070

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...6.0341

OSO CREEK TECHNICAL ASSISTANCE STUDY -  
PRELIMINARY STUDY ON THE PROBLEMS AND OP-  
PORTUNITIES FOR DEVELOPMENT OF OSO CREEK  
AND OSO BAY ...6.0380

ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EF-  
FECTS OF TROPICAL STORM AGNES ON THE UPPER  
CHESAPEAKE BAY AND SELECTED TRIBUTARIES  
...8.0009

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...9.0049

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

SAN FRANCISCO BAY ...15.0013

DEPOSITION OF HAWAIIAN WATERSHED AND  
ESTUARINE SEDIMENTS ...15.0018

NATIONAL SHORELINE STUDY - INVENTORY REPORT -  
LOWER MISSISSIPPI REGION ...15.0021

### **Evaporation Instruments**

*See Meteorology*  
*Techniques and Instrumentation*

### **Evapotranspiration**

*See Water Supply*  
*Water Loss*

### **Excavation**

*See Buildings & Land Development*  
*Construction*

### **Excitation**

*See Engineering Mechanics*  
*Mechanical Vibrations*

### **Expansive**

*See Soil Science and Mechanics*  
*Soil Types*



<b>External</b>	<b>Filtration</b>
<i>Engineering Mechanics Stresses</i>	<i>See Water Quality Water Quality Control</i>
<b>Extinguishers</b>	<b>Fire Behavior</b>
<i>Fire Research Fire Control</i>	<i>See Forestry Forest Fire</i>
<b>Failure</b>	<b>Fire Control</b>
<i>Engineering Mechanics</i>	<i>See Fire Research See Forestry Forest Fire</i>
<b>Families</b>	<b>Fire Damage, Recovery</b>
<i>Occupations, Populations</i>	<i>See Forestry Forest Fire</i>
<b>Family Housing Construction</b>	<b>Fire Department</b>
<i>Home Economics</i>	<i>See Fire Research</i>
<b>Farm Safety</b>	<b>Fire Hazard</b>
<b>MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE ...7.0002</b>	<i>See Fire Research Fire Control</i>
<b>Farmers</b>	<b>Fire Research</b>
<i>Occupations, Populations</i>	<b>COMBUSTION</b>
<b>Fatigue</b>	<b>CONTROL AND USE OF FIRE PARTICULARLY IN WIL- DERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020</b>
<i>Engineering Mechanics</i>	<b>NATIONAL FIRE DANGER RATING ...5.0027</b>
<b>Faults</b>	<b>THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY ...5.0030</b>
<i>Structural Geology</i>	<b>FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0045</b>
<b>Federal Government</b>	<b>DIFFUSION FLAME</b>
<i>Law &amp; Water Legislative Levels Water Resources Management</i>	<b>NATIONAL FIRE DANGER RATING ...5.0027</b>

DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS ...5.0011  
SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES ...5.0046

#### *Extinguishers*

DEVELOPMENT OF AIR OPERATIONS IN THE FIRE SERVICE - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV) ...5.0009  
DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS ...5.0011  
CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014  
MECHANISMS OF WILDLAND FIRE SUPPRESSION ...5.0024

#### *Fire Hazard*

DEVELOPMENT OF IMPROVED TECHNIQUES FOR PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0012

#### *Fire Spread*

DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR THE SOUTHWEST ...5.0012  
FIRE BEHAVIOR - CALIFORNIA ...5.0006  
CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH ...5.0008  
CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014  
PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA ...5.0018  
NATIONAL FIRE DANGER RATING ...5.0027  
FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
DEVELOPMENT OF IMPROVED TECHNIQUES FOR PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0012  
THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

#### *Fire Whirl*

WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0015

#### *Forest Fires*

TRAINING THE FOREST INCENDIARIST - AN ANALYSIS OF DOCUMENTED CASE HISTORIES ...5.0001  
DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR THE SOUTHWEST ...5.0012  
MANAGEMENT SYSTEMS ...5.0007

TECHNOLOGY (FIRE PREVENTION) ...5.0017  
CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020  
MECHANISMS OF WILDLAND FIRE SUPPRESSION ...5.0024  
FIRE PREVENTION - CALIFORNIA ...5.0025  
NATIONAL FIRE DANGER RATING ...5.0027  
FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
FOREST FIRE STATISTICAL PROBLEMS ...5.0041  
DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042  
THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043  
FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES ...5.0046

#### *Retardants*

DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS ...5.0011  
CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020

#### *Smoke*

CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH ...5.0008  
DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS ...5.0044

#### *FIRE DEPARTMENT*

EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV) ...5.0009

#### *FLAMMABILITY*

CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020

#### *IGNITION*

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA ...5.0018

## **TYPES OF FIRE**

### ***Aircraft Fire***

EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV) ...**5.0009**

### ***Building Fire***

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS ...**16.0044**

### ***Forest Fire***

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...**5.0002**

FOREST FIRE BEHAVIOR - CALIFORNIA ...**5.0006**

FIRE MANAGEMENT SYSTEMS ...**5.0007**

EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV) ...**5.0009**

THE GREAT OAKLAND, LOS ANGELES, AND SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970 ...**5.0012**

FIRE CONTROL, PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...**5.0014**

CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...**5.0020**

A MODEL OF THE FORESTS OF GLACIER NATIONAL PARK, MONTANA ...**5.0021**

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...**5.0033**

ALLOCATION MODEL FOR FIREFIGHTING RESOURCES ...**5.0035**

DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS ...**5.0044**

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...**5.0045**

## **Fire Weather**

*See Meteorology*

## **Fiscal Studies**

*See Economics*  
*Income Analysis*

## **Fish and Wildlife**

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA ...**6.0033**

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...**6.0130**

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...**6.0195**

UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA ...**6.0196**

BIG CREEK WATERSHED, KANSAS ...**6.0202**

MACADOO ROAD-FILL DAM, KANSAS ...**6.0203**

MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI ...**6.0320**

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...**6.0408**

REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974 ...**16.0040**

## **Fishing**

*See Recreation*  
*Recreation Activities*

## **Flammability**

*See Fire Research*

## **Flood Control Planning**

*See Water Resources Management*

## **Flood Control Reservoirs**

*See Reservoirs and Impoundments*

## **Floodplains**

CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...**6.0007**

UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL ...**6.0017**

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...**6.0018**

MILTON SOUTH, MILTON NORTH AND TURBO TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA ...**6.0027**

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...**6.0034**

WORTH OF HYDROLOGIC DATA FOR SHORT-TERM

EVALUATION OF URBAN FLOOD PLAINS ...6.0132

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136

INVESTIGATIONS - TENNESSEE ...6.0147

MEANS FOR REDUCING FLOOD DAMAGE IN THE SOUTHEAST ALABAMA REGION ...6.0158

MANAGEMENT STUDY ...6.0159

MANAGEMENT STUDY - TUSCALOOSA, SHELBY COUNTY AND MOUNDSVILLE, ALABAMA, 1971 ...6.0160

WAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS OF JEFFERSON COUNTY, ALABAMA ...6.0161

EFFECTS OF REGULATIONS IN FLOOD-PRONE AREAS - A COMPARISON OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162

HYDROLOGIC SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS ...6.0173

HYDROLOGIC SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND IMPACT EVALUATION ...6.0174

STUDY OF RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA ...6.0178

FINAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179

QUANTITATIVELY DEFINED ENVIRONMENTAL VALUES IN WATER RESOURCES PLANNING ...6.0191

ROCKWATER CREEK WATERSHED, KANSAS ...6.0202

ROCKWATER CREEK HYDROLOGIC UNIT PROJECT, CHEROKEE HILLS RC AND D PROJECT, IOWA ...6.0206

FORM TECHNIQUE FOR DETERMINING FLOOD FREQUENCIES ...6.0224

GLAND RIVER BASINS COMMISSION, ANNUAL REPORT, FISCAL YEAR 1971 ...6.0227

REGULATIONS OF THE CITY OF SARASOTA, FLORIDA ...6.0232

MODE AND FREQUENCY OF FLOODS ON SMALL URBAN AREAS IN FLORIDA ...6.0233

GRAPHIC ANALYSIS OF THE HILLS, ALABAMA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE ...6.0235

PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236

EFFECTS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239

THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

WATER RESOURCES OF MIDDLE GEORGIA ...6.0245

HYDROLOGIC RELATIONS IN HAWAII ...6.0247

FLOOD INUNDATION STUDY - WISCONSIN ...6.0248

FLOOD PLAIN MAPPING IN HAWAII ...6.0250

SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251

NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973 ...6.0253

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO ...6.0266

ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272

FLOOD PROFILES OF IOWA STREAMS ...6.0274

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0275

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA ...6.0277

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0279

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0280

ZONING ORDINANCE - PAINTSVILLE, KENTUCKY ...6.0284

FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY ...6.0286

DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291

LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE CONNECTICUT RIVER FLOOD PLAINS ...6.0293

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294

RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 ...6.0295

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT ...6.0302

FLOOD PLAIN STUDIES - MINNESOTA ...6.0304

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306

URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (ABBREV) ...6.0307

URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV) ...6.0308

MISSISSIPPI BASIN MODEL ...6.0313

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA ...6.0321

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS ...6.0324

FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY ...6.0325

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE ...6.0333

APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN ...6.0337

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343

COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN ...6.0346

DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM ...6.0347

STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP AND TILLAMOOK COUNTIES, OREGON - 1972-1973 ...6.0352

DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973 ...6.0354

FLOOD PLAIN INUNDATION ...6.0364

ZONING ORDINANCE, HUNTINGDON, TENNESSEE ...6.0369

WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379

OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380

URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397

FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398

URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400

PILOT STUDY OF FLOOD PLAIN MANAGEMENT - WASHINGTON ...6.0402

FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON ...6.0404

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407

WATER RESOURCES POLICY IN WISCONSIN - VOLUME IV - FLOOD PLAIN MANAGEMENT ...6.0410

NEW TECHNIQUES FOR DELINEATION OF FLOOD PLAIN HAZARD ZONES - SOIL SURVEYS ...6.0411

REMOTE SENSING FOR RESOURCE MANAGEMENT AND FLOOD PLAIN DELINEATION ...6.0412

THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS ...6.0413

FLOOD INVESTIGATIONS IN WYOMING ...6.0414

PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...8.0047

SANTA CRUZ COUNTY COOP ...9.0027

## Floods

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017

DISASTER INVESTIGATIONS ...6.0001

SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS ...6.0003

FLOOD INSURANCE STUDY ...6.0005

FLOOD INSURANCE STUDY ...6.0006

CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...6.0007

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA ...6.0008

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA ...6.0009

TRAINING AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA ...6.0010

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA ...6.0011

PROCEEDINGS - COMMUNITY WORKSHOP ON FLOOD

A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES ...6.0016

UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL ...6.0017

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES ...6.0019

FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO ...6.0020

METEOROLOGICAL AND HYDROLOGICAL ANALYSIS OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD ...6.0021

THE METEOROLOGICAL AND HYDROLOGICAL ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS ...6.0022

FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023  
MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA ...6.0025

MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA ...6.0027

DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA ...6.0028

KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY ...6.0030

STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031

NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I ...6.0032

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034

ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA ...6.0035

WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS ...6.0036

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME II, APPENDICES ...6.0040

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...6.0041

SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA ...6.0043

HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...6.0045

INITIAL WATER, SEWERAGE AND FLOOD ...6.0047

FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION ...6.0051

CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION ...6.0053

BLACK HILLS FLOOD OF JUNE 9, 1972 ...6.0056

ESSA AND OPERATION FORESIGHT ...6.0057

FLOOD FLOWS FROM SMALL DRAINAGE AREAS ...6.0058

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO ...6.0059

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061

FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA ...6.0062

FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO ...6.0063

COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064

FLOOD FREQUENCY IN SMALL DRAINAGE AREAS MISSISSIPPI ...6.0065

RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073

FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075

URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076

FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0077

INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS ...6.0078

FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079

A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082

- PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESERVOIR SYSTEMS ...6.0089
- STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090
- FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091
- STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV) ...6.0092
- FLOOD-FREQUENCY STUDY - KENTUCKY ...6.0093
- FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094
- GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV) ...6.0096
- NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION ...6.0097
- MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA) ...6.0099
- FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102
- HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE ...6.0103
- HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104
- FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106
- HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT ...6.0108
- OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS ...6.0109
- FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113
- BRIDGE SITE INVESTIGATIONS ...6.0114
- SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115
- DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION ...6.0117
- ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION ...6.0118
- FLOOD WAVES FROM A CONTROLLED BREACHED DAM ...6.0124
- APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT ...6.0125
- INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129
- AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132
- EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134
- RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA ...6.0137
- MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138
- STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140
- BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142
- TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN ...6.0143
- OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS ...6.0144
- FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS ...6.0145
- FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS ...6.0146
- FLOOD INVESTIGATIONS - TENNESSEE ...6.0147
- HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149
- OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150
- PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS ...6.0152
- MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153
- RUNOFF SIMULATION ...6.0156
- A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION ...6.0158
- FLOOD MANAGEMENT STUDY ...6.0159
- FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160
- FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161
- LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162
- DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL ...6.0163
- APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES ...6.0164
- DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES ...6.0165
- THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166
- STOCHASTIC HYDROLOGY ...6.0167
- URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174

FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176

PROCEDURES FOR ESTIMATING FLOOD FLOWS FROM SMALL RURAL WATERSHEDS ...6.0177

FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180

FLOOD HYDROLOGY INVESTIGATIONS ...6.0183

DENVER METROPOLITAN AREA, COLORADO ...6.0184

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...6.0185

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186

FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187

HAMILTON 2 DEGREE ...6.0188

INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES ...6.0189

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

SMALL STREAM FLOOD CHARACTERISTICS ...6.0193

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA ...6.0206

HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA ...6.0208

INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209

PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT ...6.0210

HYDROLOGY OF OUTSTANDING FLOODS ...6.0211

FLOOD FREQUENCY OF ALABAMA STREAMS - ALABAMA ...6.0213

FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0214

FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215

WATER RESOURCES INVESTIGATIONS ...6.0216

INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0217

IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS ...6.0218

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0219

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...6.0221

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS

FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES ...6.0225

REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226

FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES ...6.0229

GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE ...6.0235

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236

SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239

THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240

THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242

A PROGRAM FOR METROPOLITAN WATER MANAGEMENT ...6.0243

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246

HYDROLOGIC RELATIONS IN HAWAII ...6.0247

FLOOD INUNDATION STUDY - WISCONSIN ...6.0248

SPECIAL FLOOD DATA COLLECTION, HAWAII ...6.0249

FLOOD PLAIN MAPPING IN HAWAII ...6.0250

SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251

HAWAII ENVIRONMENTAL SIMULATION MODEL ...6.0252

MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO ...6.0254

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS ...6.0255

FLOOD FREQUENCY STUDY ILLINOIS ...6.0256

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258

RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259

FLOOD INUNDATION MAPPING, NORTHEASTERN



- COUNTY, IOWA ...6.0275
- FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276
- FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA ...6.0277
- FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA ...6.0278
- FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0279
- FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0280
- EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281
- EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282
- ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY ...6.0283
- FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY ...6.0286
- SMALL STREAMS FLOOD FREQUENCY IN MAINE ...6.0287
- CLIMATES OF THE STATES - CLIMATE OF NEW YORK ...6.0289
- PROBABLE MAXIMUM PRECIPITATION AND SNOW-MELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA ...6.0290
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297
- USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS ...6.0298
- PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN ...6.0299
- AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300
- FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301
- THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT ...6.0302
- WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303
- FLOOD PLAIN STUDIES--MINNESOTA ...6.0304
- FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305
- SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306
- CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310
- RELATIONSHIPS OF MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316
- HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317
- STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318
- HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319
- MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI ...6.0320
- FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA ...6.0321
- EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY ...6.0322
- ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS ...6.0324
- FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY ...6.0325
- DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326
- FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327
- THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328
- STREAMS AND DRAINAGE BASINS - FULTON COUNTY, NEW YORK ...6.0329
- PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330
- FLOOD INVESTIGATIONS - NEW YORK ...6.0331
- REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I ...6.0334
- HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338
- URBAN RUNOFF ...6.0339
- EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...6.0341
- EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342
- EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343
- MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344
- COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345
- DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM ...6.0347
- STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348
- FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349

ILATION OF FLOOD ABATEMENT PROJECTS IN  
 ON ...6.0353  
 PMENT IN FLOOD-PRONE AREAS OF LINCOLN  
 TY, OREGON AUGUST, 1973 ...6.0354  
 LUATION OF HURRICANE AGNES FLOODS IN  
 ARISON TO BRIDGE DESIGN INFORMATION  
 ABLE FOR PENNSYLVANIA CONTEMPORANE-  
 / ...6.0355  
 RISON OF RECENTLY PUBLISHED FORMULAE  
 FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356  
 FECT OF GROUND-WATER CONDITIONS ON  
 L FLOODING IN THE KINGSTON AREA,  
 SYLVANIA ...6.0357  
 VATIVE ADJUSTMENTS TO NATURAL HAZARDS  
 9  
 OF AGNES FLOODS ON ANNUAL SERIES IN  
 SYLVANIA ...6.0361  
 CONTROL STUDY OF RIO GRANDE DE MANATI,  
 TI AND BARCELONETA, PUERTO RICO ...6.0362  
 PLAIN INUNDATION ...6.0364  
 FREQUENCY OF SMALL AREAS - SOUTH  
 LINA ...6.0365  
 GATION AND ANALYSIS OF FLOOD HYDRO-  
 HS FROM SMALL DRAINAGE BASINS IN SOUTH  
 TA ...6.0366  
 PMENT OF WATER RESOURCE MANAGEMENT  
 ODS - TENNESSEE ...6.0367  
 RIVER WATERSHED PROJECT - TENNESSEE  
 58  
 NG OF SMALL STREAMS IN NASHVILLE-DAVID-  
 OUNTY AREA, TENNESSEE ...6.0370  
 GATION OF THE MAGNITUDE AND FREQUEN-  
 FLOODS ON SMALL STREAMS IN TENNESSEE  
 71  
 HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372  
 HYDROLOGY STUDIES OF SELECTED AREAS IN  
 S - DALLAS, AUSTIN ...6.0373  
 S OF URBANIZATION ON FLOODS IN THE DAL-  
 TEXAS METROPOLITAN AREA ...6.0374  
 S OF URBANIZATION ON FLOODS IN THE  
 TON, TEXAS METROPOLITAN AREA ...6.0376  
 HYDROLOGY STUDY - SAN ANTONIO, TEXAS  
 77  
 QUE FOR PROJECTING ALTERNATIVE FUTURES  
 WATER RESOURCE PLANNING ...6.0378  
 ND WATER CONSERVATION NEEDS INVENTORY,  
 E, GRAYSON AND FANNIN COUNTIES, TEXAS  
 81  
 HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382  
 HYDROLOGY STUDY - FORT WORTH, TEXAS  
 83  
 HYDROLOGY STUDY - DALLAS COUNTY,  
 S ...6.0384

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL  
 SYSTEM RELATED TO DRAINAGE PROBLEMS OF  
 URBAN AREAS ...6.0390  
 FLASH FLOOD FORECASTING AND WARNING PRO-  
 GRAM IN THE WESTERN REGION ...6.0391  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH  
 ...6.0392  
 SURVEY OF LAKE FLOODING FROM ERTS-I - LAKE  
 CHAMPLAIN ...6.0393  
 TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
 USE MANAGEMENT OF FLOOD PLAINS ...6.0394  
 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLO-  
 GY IN THE CENTRAL APPALACHIAN REGION - VIR-  
 GINIA ...6.0395  
 FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE  
 TO LOCAL GOVERNMENT ...6.0398  
 FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA  
 ...6.0399  
 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUN-  
 TY ...6.0400  
 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX  
 COUNTY, VIRGINIA ...6.0401  
 PILOT STUDY OF FLOOD PLAIN MANAGEMENT -  
 WASHINGTON ...6.0402  
 FLOOD PROFILES AND INUNDATED AREAS ALONG  
 THE LOWER NISQUALLY RIVER, WASHINGTON  
 ...6.0403  
 FLOOD PROFILES AND INUNDATED AREAS ALONG  
 THE SKOKOMISH RIVER, WASHINGTON ...6.0404  
 FLOOD HAZARD INFORMATION - BUFFALO CREEK,  
 LOGAN COUNTY, WEST VIRGINIA POST-DISASTER  
 CONDITIONS ...6.0405  
 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II)  
 ...6.0407  
 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
 THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
 SIN ...6.0408  
 FLOOD INUNDATION STUDY, WISCONSIN ...6.0409  
 NEW TECHNIQUES FOR DELINEATION OF FLOOD  
 PLAIN HAZARD ZONES - SOIL SURVEYS ...6.0411  
 REMOTE SENSING FOR RESOURCE MANAGEMENT AND  
 FLOOD PLAIN DELINEATION ...6.0412  
 THE USE OF DETAILED SOILS INFORMATION FOR  
 DELINEATING AND REGULATING FLOOD PLAINS -  
 LEGAL AND ADMINISTRATIVE CONSIDERATIONS  
 ...6.0413  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
 STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
 DRAINAGE BASINS IN WYOMING ...6.0415  
 ATLANTIC HURRICANE SEASON OF 1972 ...8.0005  
 EFFECTS OF HURRICANE CAMILLE ON THE LAND-  
 SHAPE OF THE BRETON-CHANDELEUR ISLAND  
 CHAIN AND THE EASTERN PORTION OF THE LOWER  
 MISSISSIPPI DELTA ...8.0008

THE EVENTS OF AGNES ...8.0022

PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123

OPERATION AGNES ...8.0135

ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLENDORA, CALIFORNIA ...9.0026

ECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018

SUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY ...13.0028

NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT ...15.0019

RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID ...16.0019

TRAINING PROGRAM FOR CRISIS INTERVENORS ...16.0020

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025

ASSESSMENT OF RESEARCH ON NATURAL HAZARDS ...16.0028

NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS ...16.0030

NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE ...16.0047

FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS ...16.0071

THE INVESTIGATION OF SHELTER MANAGEMENT AND CONTROL IN NATURAL DISASTER ...16.0079

## Floors

*See Buildings & Land Development  
Components and Equipment*

## Flow Characteristics

*See Fluid Dynamics  
See Hydraulics*

## Flow Routing

*See Techniques and Instrumentation  
Synthetic Hydrology*

## Fluid Dynamics

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396

### Flow Characteristics

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212

LONG-PERIOD WAVES AND SURGES ...8.0073

CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088

NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH ...8.0117

ANALYTICAL PHYSICAL MODEL ...8.0126

### Hydrodynamics

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212

LONG-PERIOD WAVES AND SURGES ...8.0073

### Outfalls

STUDIES OF THE RED ALGAE IN BISCAYNE BAY ...6.0070

### Plumes

CORRELATION OF SATELLITE AND GROUND DATA IN AIR POLLUTION STUDIES (ABBREV) ...5.0032

## Fluid Injection

*See Geophysics  
Seismology*

## Fluid Migration

*See Economic Geology  
Oil and Natural Gas Reservoirs*

### Flumes

*See Hydraulics*

## Fluorspar

*See Economic Geology  
Non-metallic Deposits*

## **Fog - Mist Dissipation**

*See Meteorology*  
*Weather Modification*

## **Folds**

*See Structural Geology*

## **Forces and Loadings**

*See Engineering Mechanics*

## **Forecasting**

*See Meteorology*

## **Forecasting - Prediction**

*See Techniques and Instrumentation*

## **Forest Fire**

*See Fire Research*  
*Types of Fire*  
*See Forestry*

## **Forest Fires**

*See Fire Research*  
*Fire Control*

## **Forest Management**

*See Forestry*

## **Forestry**

EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV) ...5.0009

A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I - SUMMARY - MAIN STUDY RECOMMENDATIONS AND FINDINGS ...5.0010

THE GREAT OAKLAND, LOS ANGELES, AND SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970 ...5.0012

AIRBORNE INFRARED FOREST FIRE DETECTION SYSTEM ...5.0028

RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION ...5.0029

THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY ...5.0030

CORRELATION OF SATELLITE AND GROUND DATA IN AIR POLLUTION STUDIES (ABBREV) ...5.0032

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033

ALLOCATION MODEL FOR FIREFIGHTING RESOURCES ...5.0035

FOREST FIRE STATISTICAL PROBLEMS ...5.0041

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0045

## **DENDROCHRONOLOGY**

TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH ...9.0055

## **FOREST FIRE**

FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034

CHARACTERISTICS OF PEOPLE WHO START FIRES ...SOME PRELIMINARY FINDINGS - CALIFORNIA ...5.0036

FOREST FIRE HISTORY - A COMPUTER METHOD OF DATA ANALYSIS ...5.0038

SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042

## **Fire Behavior**

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...5.0002

PHYSICAL CHARACTERISTICS OF CHAMISE AS A WILDLAND FUEL - CALIFORNIA ...5.0003

FIRE WEATHER AND FIRE BEHAVIOR AT THE 1968 CANYON FIRE - CALIFORNIA ...5.0004

FOREST FIRE BEHAVIOR - CALIFORNIA ...5.0006

FIRE MANAGEMENT SYSTEMS ...5.0007

CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH ...5.0008

DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS ...5.0011

FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014

FOREST FIRES IN MISSOURI ...5.0015

FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA ...5.0016

LIGHTNING FIRES ...5.0017  
MECHANISMS OF WILDLAND FIRE SUPPRESSION  
...5.0024

NATIONAL FIRE DANGER RATING ...5.0027

PROBABILITY FIRE WEATHER FORECASTS SHOW  
PROMISE IN 3-YEAR TRIAL ...5.0039

FOREST FIRE METEOROLOGY IN THE PACIFIC  
COASTAL REGION ...5.0040

DEVELOPMENT OF IMPROVED TECHNIQUES FOR  
USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
...5.0042

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

#### *Fire Control*

GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA  
MIXED-CONIFER TYPE ...5.0005

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA ...5.0013

FOREST FIRES IN MISSOURI ...5.0015

FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX  
FIRE - MINNESOTA ...5.0016

OPERATING PLAN FOR FIRE WEATHER SERVICE IN  
SOUTH CAROLINA ...5.0031

#### *Fire Damage, Recovery*

PROFILING THE FOREST INCENDIARIST - AN ANALYSIS  
OF DOCUMENTED CASE HISTORIES ...5.0001

DEVELOPMENT OF NEW AND IMPROVED FIRE CON-  
TROL METHODS FOR SOUTHERN FORESTS ...5.0011

FIRE CONTROL PLANNING AND FIRE PREVENTION IN  
THE NORTHEASTERN UNITED STATES ...5.0014

DEVELOPMENT OF IMPROVED TECHNIQUES FOR  
USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
...5.0042

FIRE ON A FOREST SOIL ...5.0047

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTA-  
BLE BRUSHLANDS OF THE SOUTHWEST ...5.0002

#### *Fire Prevention*

GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA  
MIXED-CONIFER TYPE ...5.0005

FOREST FIRE BEHAVIOR - CALIFORNIA ...5.0006

FIRE MANAGEMENT SYSTEMS ...5.0007

DEVELOPMENT OF NEW AND IMPROVED FIRE CON-  
TROL METHODS FOR SOUTHERN FORESTS ...5.0011

FIRE CONTROL PLANNING AND FIRE PREVENTION IN  
THE NORTHEASTERN UNITED STATES ...5.0014

RESEARCH AND DEVELOPMENT OF FIRE PREVENTION  
TECHNOLOGY (FIRE PREVENTION) ...5.0017

METHODS FOR THE PREVENTION AND CONTROL OF  
LIGHTNING FIRES ...5.0019

OPERATING PLAN FOR FIRE WEATHER SERVICE IN  
SOUTH CAROLINA ...5.0031

REDUCING FIRE HAZARD IN PONDEROSA PINE THIN-  
NING SLASH BY MECHANICAL CRUSHING - OREGON  
...5.0037

DEVELOPMENT OF IMPROVED TECHNIQUES FOR  
USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
...5.0042

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

#### *Fire Use for Silviculture*

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
...5.0002

DEVELOPMENT OF NEW AND IMPROVED FIRE CON-  
TROL METHODS FOR SOUTHERN FORESTS ...5.0011

DEVELOPMENT OF IMPROVED TECHNIQUES FOR  
USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
...5.0042

FIRE ON A FOREST SOIL ...5.0047

#### *Forest Management*

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
...5.0002

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPER-  
TIES OF FUELS RELATED TO FIRE PHENOMENA  
...5.0018

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN  
FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
...6.0074

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

#### *Forestry Survey and Mapping*

RESEARCH AND DEVELOPMENT OF FIRE PREVENTION  
TECHNOLOGY (FIRE PREVENTION) ...5.0017

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPER-  
TIES OF FUELS RELATED TO FIRE PHENOMENA  
...5.0018

FIRE PREVENTION - CALIFORNIA ...5.0025

DEVELOPMENT OF IMPROVED TECHNIQUES FOR  
USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
...5.0042

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

#### *Lumbering*

FIRE CONTROL PLANNING AND FIRE PREVENTION  
IN THE NORTHEASTERN UNITED STATES ...5.0014

FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014

## **SILVICULTURE**

### *Clear Cutting*

EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES ...9.0052

### *Ecology and Morphology*

TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH ...9.0055

### *Forest Environment*

FOREST FIRE BEHAVIOR - CALIFORNIA ...5.0006

FIRE MANAGEMENT SYSTEMS ...5.0007

FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014

DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...15.0002

### *Forest Litter*

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...5.0002

FOREST FIRE BEHAVIOR - CALIFORNIA ...5.0006

FIRE MANAGEMENT SYSTEMS ...5.0007

DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS ...5.0011

FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES ...5.0014

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA ...5.0018

CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020

ADDITIONAL FIRE DANGER RATING ...5.0027

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

FIRE ON A FOREST SOIL ...5.0047

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...15.0002

FIRE ON A FOREST SOIL ...5.0047

EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES ...9.0052

ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO ...9.0060

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...15.0002

### *Physiology, Plant Chemistry*

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...5.0002

## **Forestry Survey and Mapping**

*See Forestry*

## **Formation**

*See Stratigraphy*

## **Fossil Fuels**

*See Energy Conversion*

## **Fossil Invertebrates**

*See Paleontology*

*Fossil Organisms*

## **Fossil Plants**

*See Paleontology*

*Fossil Organisms*

## **Fossil Vertebrates**

*See Paleontology*

*Fossil Organisms*

## **Foundations**

*See Soil Science and Mechanics*

## **Fracture Mechanics**

*See Engineering Mechanics*

*See Mechanics of Structures*

## Freeways

*See Transportation Engineering  
Highway Classification*

## Freight

*See Transportation Engineering  
Services*

## Frequency

*See Engineering Mechanics  
Mechanical Vibrations*

## Fresh Water

*See Water Types*

## Fronts

*See Meteorology  
Atmosphere Disturbance*

## Frost

*See Meteorology  
Meteorological Condensation*

## Frost Heaving

*See Soil Science and Mechanics  
Physical Properties*

## Fuels

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA  
...5.0018

## Futures Research

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN

BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0009

PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT ...6.0385

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025

## SHORT RANGE FORECASTING

GLENDORA, CALIFORNIA, GENERAL PLAN 1990  
...6.0170

## Gaging

*See Techniques and Instrumentation*

## Gases

*See Air Pollution  
Types of Pollutants*

## Gates

*See Hydraulics*

## Geochemistry

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262  
HAWAIIAN VOLCANO OBSERVATORY ...14.0004  
SAN FRANCISCO BAY ...15.0013

## CRUST

GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032

## TRACE ELEMENT ANALYSIS

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...14.0013

## VOLCANOES

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
...14.0009

RAINWATER CONTAMINATION BY VOLCANIC

*See Techniques and Instrumentation*

## **Geodetic Surveys**

*See Geophysics*

## **Geodetic Tillmeters**

*See Geophysics  
Geophysical Instrumentation*

## **Geologic History**

*See Stratigraphy*

## **Geologic Maps**

*See Techniques and Instrumentation  
Maps and Surveys*

## **Geologic Sections**

*See Techniques and Instrumentation  
Maps and Surveys*

## **Geological Exploration**

*See Economic Geology*

## **Geology & Rock Mechanics**

*See Transportation Engineering  
Basic Studies*

## **Geometric Configuration**

*See Mechanics of Structures*

## **Geomorphology**

### **ENGINEERING GEOLOGY**

ENGINEERING SEISMOLOGY ...3.0019

PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN  
7-1/2-MINUTE QUADRANGLES AND VICINITY,  
CALIFORNIA ...3.0121

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA

STUDY FOR THE CITY OF GLENORA, CALIFORNIA  
...9.0026

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...9.0041

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
SITKA AREA, ALASKA ...13.0018

ENVIRONMENTAL PLANNING AND GEOLOGY -  
PROCEEDINGS OF THE SYMPOSIUM ON ENGINEER-  
ING GEOLOGY IN THE URBAN ENVIRONMENT  
...16.0054

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

### *Airfield Sites*

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008

### *Bridge Sites*

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008

INVESTIGATION OF RED RIVER VALLEY GEOLOGY -  
EFFECTS ON STRUCTURE DESIGN AND PER-  
FORMANCE ...9.0018

### *Dam Sites*

VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
...3.0006

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039

TETON DAM SEISMICITY - IDAHO ...3.0050

ANALYSIS OF THE SLIDES IN THE SAN FERNANDO  
DAMS DURING THE EARTHQUAKE OF FEBRUARY 9,  
1971 ...3.0095

EVALUATION OF THE INCREMENTAL SEISMIC RISK  
DUE TO RESERVOIR FILLING ...3.0142

GLEN CANYON AND AUBURN DAM SEISMICITY -  
COLORADO ...3.0166

EARTH AND ROCKFILL DAM DESIGN PRACTICES  
...3.0171

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES  
IN EARTH DAMS ...3.0231

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062

VERDE LANE FLOOD PREVENTION PROJECT MEA-  
SURE, NEBRASKA ...6.0205

RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A



ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021

### *Highway Sites*

AVALANCHE STUDIES, 1971-1972 ...1.0001

NORTH CASCADES HIGHWAY SR-20 AVALANCHE  
ATLAS ...1.0002

AVALANCHES ON THE NORTH CASCADES HIGHWAY  
(SR-20) - SUMMARY REPORT ...1.0006

THE SAN FERNANDO EARTHQUAKE SOILS AND  
GEOLOGIC INVESTIGATIONS IN RELATION TO  
HIGHWAY DAMAGE ...3.0012

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN  
COUNTY, IOWA ...6.0275

FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN RHODE ISLAND ...6.0297

ENGINEERING GEOLOGY - ILLINOIS ...9.0011

INVESTIGATION OF LANDSLIDES ON HIGHWAYS  
...9.0014

LANDSLIDES - KENTUCKY ...9.0015

CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GOR-  
MAN, CALIFORNIA ...9.0017

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
POTENTIAL IN THE PIERRE SHALE ...9.0022

A SURVEY OF EARTH SLOPE FAILURES AND REMEDI-  
AL MEASURES IN TEXAS ...9.0023

EARLY DETECTION AND CORRECTION OF SINKHOLE  
PROBLEMS - ALABAMA ...10.0027

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...10.0031

EROSION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA-  
BLE SOILS IN THREE SMALL WESTERN OREGON  
WATERSHEDS ...15.0034

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

### *Structure Sites*

REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008

ENGINEERING GEOLOGY - ILLINOIS ...9.0011

DENVER METROPOLITAN AREA, COLORADO ...9.0042

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
OF COASTAL COMMUNITIES, ALASKA ...10.0021

### *Tunnel Sites*

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND

COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004

### *EOLIAN GEOMORPHIC FEATURES*

THE USE OF GRASSES FOR DUNE STABILIZATION  
ALONG THE GULF COAST WITH INITIAL EMPHASIS  
ON THE TEXAS COAST ...8.0049

KENNEDY SPACE CENTER OCEAN BEACH EROSION -  
FLORIDA ...15.0005

STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
RICANE PROTECTION PROJECT, STATEN ISLAND,  
NEW YORK ...15.0009

BEACH EROSION PROJECT, DELAWARE COAST PRO-  
TECTION PROJECT, DELAWARE ...15.0010

ENVIRONMENTAL GEOMORPHIC STUDY OF THE  
COASTAL REGIMES ALONG THE SOUTH SHORE OF  
LONG ISLAND - NEW YORK ...15.0027

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

### *GROUNDWATER FEATURES*

CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF  
COAST AREA ...10.0032

### *Caves - Sink Holes*

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230

DETECTION OF SUBSURFACE OPENINGS - INDIANA,  
MISSOURI ...10.0009

EARLY DETECTION AND CORRECTION OF SINKHOLE  
PROBLEMS - ALABAMA ...10.0027

REMOTE SENSING, ALFAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...10.0031

### *Karst Topography*

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230

DETECTION OF SUBSURFACE OPENINGS - INDIANA,  
MISSOURI ...10.0009

REMOTE SENSING, ALFAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

### *Thermal Features*

SEISMICITY AND CONTEMPORARY TECTONICS OF THE  
YELLOWSTONE PARK-HEBGEN LAKE REGION  
...3.0275

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...14.0012

### *Mass Wasting*

STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA ...3.0138

STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS ...9.0012

EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES ...9.0052

TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH ...9.0055

DEVELOPMENT OF CRITERIA FOR RECOGNIZING & IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED BY REMOTE SENSOR RETURNS - NORTH CAROLINA 9.0063

### *Land and Rock Slides*

PUGET PEAK AVALANCHE, ALASKA ...1.0007

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES 1.0009

AVALANCHE CONTROL IMPLEMENTATION STUDY 1.0014

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...3.0011

ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971 3.0095

A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...3.0179

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA ...9.0001

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA ...9.0002

MOBILIZATION OF DEBRIS FLOWS 9973-EN ...9.0003

GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS ...9.0004

EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...9.0007

LOCATION OF SLOPE FAILURE PLANES ...9.0009

SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK ...9.0010

INVESTIGATION OF LANDSLIDES ON HIGHWAYS ...9.0014

LANDSLIDES - KENTUCKY ...9.0015

SLOPE STABILITY OF CUTS IN ONTONAGON CLAY ...9.0016

CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA ...9.0017

INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE ...9.0018

SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019

FLOW SLIDE CONTROL WITH SLOPE REVETMENTS ...9.0020

ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023

MECHANICS OF DEBRIS AVALANCHING IN SHALLOW TILL SOILS OF SOUTHEAST ALASKA ...9.0024

ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLENDORA, CALIFORNIA ...9.0026

SANTA CRUZ COUNTY COOP ...9.0027

EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION ...9.0028

GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA ...9.0029

MONTEREY BAY - CALIFORNIA ...9.0030

GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA ...9.0033

MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA ...9.0034

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING ...9.0035

DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA ...9.0036

LIME SOIL STABILIZATION STUDY ...9.0037

EVALUATION OF 'ION EXCHANGE' LANDSLIDE CORRECTION TECHNIQUE - CALIFORNIA ...9.0038

EVALUATION OF THE ION EXCHANGE LANDSLIDE CORRECTION TECHNIQUE ...9.0039

SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...9.0043

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...9.0046

EVALUATION OF CRITERIA FOR LANDSLIDE ANALYSIS  
AS PRESENTED IN THE U.S.G.S. ...9.0047

HAMILTON 2 DEGREE ...9.0048

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...9.0049

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSIS-  
SIPPI ...9.0053

ROCK STRENGTH FROM FAILURE CASES ...9.0054

TREE-RING DATING & SPATIAL ANALYSIS OF LONG-  
TERM SLOPE MOVEMENTS - UTAH ...9.0055

THE INFLUENCE OF CLAY MINERALS ON SURFICIAL  
EARTH MOVEMENTS ...9.0056

LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

DEVELOPING REMOTE SENSING TECHNIQUES FOR AID-  
ING PREDICTION OF LANDSLIDES ...9.0058

STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...9.0061

EROSION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA-  
BLE SOILS IN THREE SMALL WESTERN OREGON  
WATERSHEDS ...9.0062

DEVELOPMENT OF CRITERIA FOR RECOGNIZING &  
IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED  
BY REMOTE SENSOR RETURNS - NORTH CAROLINA  
...9.0063

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...10.0016

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
OF COASTAL COMMUNITIES, ALASKA ...10.0021

RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
SITKA AREA, ALASKA ...13.0018

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

#### *Mud Flow - Sheetwash*

GENERAL REVIEW OF THE SEISMIC HAZARD TO  
SELECTED U.S. NAVY INSTALLATIONS ...9.0004

DEVELOPMENT OF CRITERIA FOR RECOGNIZING &  
IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED  
BY REMOTE SENSOR RETURNS - NORTH CAROLINA

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO  
BAY REGION - CALIFORNIA ...3.0109

MONTEREY BAY - CALIFORNIA ...3.0116

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...9.0033

#### *Snowslides*

AVALANCHE STUDIES, 1971-1972 ...1.0001

NORTH CASCADES HIGHWAY SR-20 AVALANCHE  
ATLAS ...1.0002

ACOUSTIC EMISSION AND RELATED PROPERTIES OF  
SNOW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION 11042-EN ...1.0004

ACOUSTIC EMISSION AND RELATED PROPERTIES OF  
SNOW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION ...1.0005

AVALANCHES ON THE NORTH CASCADES HIGHWAY  
(SR-20) - SUMMARY REPORT ...1.0006

PUGET PEAK AVALANCHE, ALASKA ...1.0007

DEVELOPMENT OF METHODOLOGY FOR EVALUATION  
AND PREDICTION OF AVALANCHE HAZARD IN THE  
SAN JUAN MOUNTAINS OF COLORADO ...1.0008

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
...1.0009

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...1.0010

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

SNOW PACK STABILITY INDICES RELATIVE TO THE  
CLIMAX AVALANCHE ...1.0013

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
OF COASTAL COMMUNITIES, ALASKA ...3.0175

#### *Talus - Scree*

SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL  
SOILS ...9.0019

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

#### *PHYSIOGRAPHY*

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

FLOOD FREQUENCY OF ALABAMA STREAMS -  
ALABAMA ...6.0213

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

HYDRAULICS OF SHALLOW FLOWS OVER STABLE  
ERODED SAND SURFACES DEFINED BY AREA SPEC-  
TRA ...6.0269

#### *Erosion*

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO  
BAY REGION - CALIFORNIA ...3.0109

THE USE OF GRASSES FOR DUNE STABILIZATION  
ALONG THE GULF COAST WITH INITIAL EMPHASIS  
ON THE TEXAS COAST ...8.0049

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA

PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

HAMILTON 2 DEGREE ...9.0048

EFFECTS OF DEFORESTATION ON THE STABILITY OF  
NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

DEVELOPMENT OF CRITERIA FOR RECOGNIZING &  
IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED  
BY REMOTE SENSOR RETURNS - NORTH CAROLINA  
...9.0063

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...15.0003

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
...15.0023

COASTAL ZONE AND SHORELANDS MANAGEMENT -  
GREAT LAKES ...15.0026

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...15.0029

PROPERTIES AND STABILITY OF A TEXAS BARRIER  
BEACH INLET ...15.0035

TEXAS BARRIER ISLANDS ...15.0037

SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLO-  
GY IN THE CENTRAL APPALACHIAN REGION - VIR-  
GINIA ...15.0039

### *Topography*

SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW  
THEORIES OF TECTONICS AND EARTHQUAKE  
MECHANISM ...3.0226

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
...5.0002

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

FOREST FIRE METEOROLOGY IN THE PACIFIC  
COASTAL REGION ...5.0040

FOREST FIRE STATISTICAL PROBLEMS ...5.0041

DEVELOPMENT OF EMISSION FACTORS FOR ESTIMAT-  
ING ATMOSPHERIC EMISSIONS ...5.0044

PROGRAM FOR HYDROLOGIC INVESTIGATION OF  
SMALL DRAINAGE AREAS IN TEXAS ...6.0061

FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS  
...6.0146

FLOOD INUNDATION STUDY - WISCONSIN ...6.0248

FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY,  
NEW YORK STATE ...6.0333

DRAINAGE STUDY - INVENTORY AND ANALYSIS  
...6.0340

MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH  
...6.0392

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394

FLOOD HAZARD INFORMATION - BUFFALO CREEK,  
LOGAN COUNTY, WEST VIRGINIA POST-DISASTER  
CONDITIONS ...6.0405

TREE-RING DATING & SPATIAL ANALYSIS OF LONG-

ING PREDICTION OF LANDSLIDES ...9.0058  
STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

TSUNAMI SHORELINE TRACT ...13.0024

### *SHORELINE GEOMORPHOLOGY*

TSUNAMI SHORELINE TRACT ...13.0024

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
ORIENT POINT AND PORT JEFFERSON HARBOR  
...15.0028

### *Barriers*

STEADY-FLOW STABILITY TESTS OF NAVIGATION  
OPENING STRUCTURES, HILO HARBOR, TSUNAMI  
BARRIER, HILO, HAWAII - HYDRAULIC MODEL IN-  
VESTIGATION ...13.0010

TEXAS BARRIER ISLANDS ...15.0037

### *Bars*

OFFSET COASTAL INLETS - FORMS OF SEDIMENT AC-  
CUMULATION IN THE BEACH ZONE - ALASKA, NEW  
ENGLAND ...15.0022

PROFILE OF A STORM - WIND, WAVES AND EROSION  
ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN  
...15.0025

TEXAS BARRIER ISLANDS ...15.0037

### *Beaches*

STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
RICANE PROTECTION PROJECT, STATEN ISLAND,  
NEW YORK ...15.0009

COASTAL WORKS EVALUATION - CALIFORNIA,  
FLORIDA ...15.0015

COASTAL ENGINEERING STUDIES RELATED TO  
FLORIDA'S SHORELINE AND BEACH EROSION  
PROBLEMS ...15.0016

OFFSET COASTAL INLETS - FORMS OF SEDIMENT AC-  
CUMULATION IN THE BEACH ZONE - ALASKA, NEW  
ENGLAND ...15.0022

ENVIRONMENTAL GEOMORPHIC STUDY OF THE  
COASTAL REGIMES ALONG THE SOUTH SHORE OF  
LONG ISLAND - NEW YORK ...15.0027

### *Erosional Features*

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO  
BAY REGION - CALIFORNIA ...3.0109

THE USE OF GRASSES FOR DUNE STABILIZATION  
ALONG THE GULF COAST WITH INITIAL EMPHASIS  
ON THE TEXAS COAST ...8.0049

BEACH CHANGES BY EXTRAORDINARY WAVES  
CAUSED BY HURRICANE CAMILLE ...8.0103

FORECASTING STORM-INDUCED BEACH CHANGES  
ALONG VIRGINIA'S OCEAN COAST ...8.0134

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
...15.0001

CONCRETE BLOCK REVETMENT NEAR BENEDICT.

JEKYLL ISLAND, GEORGIA BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0007

STATEN ISLAND BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, STATEN ISLAND, NEW YORK ...15.0009

BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE ...15.0010

VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0011

SHORT-TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA ...15.0014

COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS ...15.0016

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT ...15.0019

LAKE SHORE EROSION IN ILLINOIS ...15.0020

NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION ...15.0021

OFFSET COASTAL INLETS - FORMS OF SEDIMENT ACCUMULATION IN THE BEACH ZONE - ALASKA, NEW ENGLAND ...15.0022

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS ...15.0023

SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN ...15.0024

PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN ...15.0025

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...15.0029

SHORE EROSION STUDY OF ERIE COUNTY, OHIO ...15.0030

SHORE EROSION STUDY OF LAKE COUNTY, OHIO ...15.0031

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF LAKE ERIE ...15.0032

EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC FACTORS INFLUENCING EROSION OF THE OREGON COAST ...15.0033

INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS ...15.0036

TEXAS BARRIER ISLANDS ...15.0037

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT ...15.0038

#### *Sea Cliffs*

SHORT-TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA ...15.0014

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS ...15.0023

#### *Aggradation - Degradation*

A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES ...6.0016

#### *Alluvial Fans*

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

#### *Drainage Density -texture*

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA ...9.0036

DEVELOPING REMOTE SENSING TECHNIQUES FOR AIDING PREDICTION OF LANDSLIDES ...9.0058

#### *Ephemeral Streams*

MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392

FLOOD INVESTIGATIONS IN WYOMING ...6.0414

#### *Stream Control Factors*

EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138

#### *Stream Cross-section*

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0275

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0279

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0280

FLOOD PLAIN STUDIES-MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310

FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY ...6.0325

STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP AND TILLAMOOK COUNTIES, OREGON - 1972-1973 ...6.0352

THE CENTRAL APPALACHIAN REGION - VIR-  
...15.0039

#### *Stream Gradient*

HYDROGRAPH STUDY - WYOMING ...6.0060  
ULICS OF SHALLOW FLOWS OVER STABLE  
ED SAND SURFACES DEFINED BY AREA SPEC-  
...6.0269

#### *Stream Morphology*

NT MOVEMENT AND HILLSLOPE MORPHOLO-  
THE CENTRAL APPALACHIAN REGION - VIR-  
...15.0039

#### *Stream Profile*

GRAPH MODEL STUDIES OF THE HILL-  
UGH, ALABAMA, AND ANCLOTE RIVER BASINS,  
DA ...6.0234

PLAIN AND PEAK FLOW STUDIES, NEW JERSEY  
5

FLOW SIMULATION AND FLOOD PROFILE  
MINATION IN OHIO - A PILOT STUDY ...6.0348

PLAIN INUNDATION ...6.0364

NG OF SMALL STREAMS IN NASHVILLE-DAVID-  
COUNTY AREA, TENNESSEE ...6.0370

ATION OF EMPIRICAL METHOD OF DETERMIN-  
RIVERBANK STABILITY (POTAMOLOGY IN-  
GATIONS - SOILS PHASE) ...10.0030

#### *Terraces - Benches*

IZATION OF STEEP LAND SLOPES - OHIO  
9

#### *Valleys - Canyons*

WAY EVALUATIONS BEFORE & AFTER CHAN-  
MODIFICATIONS ASSUMING TOTAL  
OPOLITAN DEVELOPMENT IN DRAINAGE  
S JEFFERSON COUNTY, ALABAMA ...6.0161

VALLEY URBAN HYDROLOGY STUDY,  
ORNIA ...6.0168

MENDED REGIONAL PLAN FOR SEWERAGE,  
R SUPPLY AND STORM DRAINAGE - CONNEC-  
...6.0192

PROFILES & FLOOD-PLAIN INFORMATION, LINN  
TY, IOWA ...6.0275

PLAIN STUDIES--MINNESOTA ...6.0304

PLAIN MANAGEMENT STUDIES - LOWER MIN-  
A RIVER ...6.0305

EFFECT OF GROUND-WATER CONDITIONS ON  
FLOODING IN THE KINGSTON AREA,  
YLVANIA ...6.0357

NT MOVEMENT AND HILLSLOPE MORPHOLO-  
THE CENTRAL APPALACHIAN REGION - VIR-  
...15.0039

STREAM FLOW CHARACTERISTICS IN MAINE  
FLOOD FREQUENCY OF SMALL STREAMS IN LOUI-  
SIANA ...6.0094

FORECASTING RAINFALL AND SNOWMELT FLOODS ON  
UPPER MIDWESTERN WATERSHEDS ...6.0113

INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL WATERSHEDS IN OKLAHOMA ...6.0140

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN VERMONT ...6.0296

FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN RHODE ISLAND ...6.0297

FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327

URBAN RUNOFF ...6.0339

DRAINAGE STUDY - INVENTORY AND ANALYSIS  
...6.0340

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
STREAMS - NORTH DAKOTA ...6.0344

FLOOD FREQUENCY OF SMALL AREAS - SOUTH  
CAROLINA ...6.0365

URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX  
COUNTY, VIRGINIA ...6.0401

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II)  
...6.0407

STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415

#### *Area*

HYDRAULICS OF SHALLOW FLOWS OVER STABLE  
ERODED SAND SURFACES DEFINED BY AREA SPEC-  
TRA ...6.0269

SMALL STREAMS FLOOD FREQUENCY IN MAINE  
...6.0287

#### *Relief*

RUNOFF FROM SMALL AGRICULTURAL AREAS IN IL-  
LINOIS ...6.0265

#### *Shape*

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

MAGNITUDE AND FREQUENCY OF FLOOD  
DISCHARGES FROM SMALL DRAINAGE BASINS, EF-  
FECTS OF DRAINAGE BASIN CHARACTERISTICS -  
NORTH DAKOTA ...6.0138

FLOOD-FREQUENCY AND BASIN PARAMETER RELA-  
TIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215

SMALL STREAMS FLOOD FREQUENCY IN MAINE  
...6.0287

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS-  
SOURI ...6.0319

#### *Slopes*

ACOUSTIC EMISSION AND RELATED PROPERTIES OF  
SNOW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION ...1.0005

IN EARTH DAMS ...3.0231  
 LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON ...3.0267  
 INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060  
 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186  
 FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187  
 SMALL STREAM FLOOD CHARACTERISTICS ...6.0193  
 FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215  
 NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258  
 SMALL STREAMS FLOOD FREQUENCY IN MAINE ...6.0287  
 NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE ...6.0333  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343  
 FLOOD PLAIN INUNDATION ...6.0364  
 SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS ...6.0381  
 REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA ...9.0002  
 EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005  
 SUBAUDIBLE ROCK NOISE (SARN) AS A MEASURE OF SLOPE STABILITY, CALIFORNIA ...9.0006  
 RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A REVIEW OF PRACTICES AND PROCEDURES ...9.0008  
 LOCATION OF SLOPE FAILURE PLANES ...9.0009  
 WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL ...9.0013  
 LANDSLIDES - KENTUCKY ...9.0015  
 SLOPE STABILITY OF CUTS IN ONTONAGON CLAY ...9.0016  
 CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA ...9.0017  
 INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE ...9.0018  
 SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019  
 FLOW SLIDE CONTROL WITH SLOPE REVETMENTS ...9.0020  
 ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021  
 LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA ...9.0029  
 MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA ...9.0034  
 DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA ...9.0036  
 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040  
 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...9.0049  
 EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051  
 EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES ...9.0052  
 ROCK STRENGTH FROM FAILURE CASES ...9.0054  
 TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH ...9.0055  
 LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057  
 STABILIZATION OF STEEP LAND SLOPES - OHIO ...9.0059  
 ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO ...9.0060  
 DEVELOPMENT OF CRITERIA FOR RECOGNIZING & IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED BY REMOTE SENSOR RETURNS - NORTH CAROLINA ...9.0063  
 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA ...15.0039

## WEATHERING PROCESSES

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA ...9.0002  
 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...9.0045

## Geophysical Analysis

*See Techniques and Instrumentation*

## Geophysics

ELECTRICAL PROPERTIES

*Electric Logging Methods*

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115

MISSOURI ...10.0009  
LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
...10.0011

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

### *Electrical Applications*

EXPERIMENTAL AND THEORETICAL STUDY OF THE  
DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE  
PREDICTION ...3.0260

### *Electromagnetic Probing*

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

### *Telluric Currents*

TSUNAMI RESEARCH ...13.0005

### *Geodetic Surveys*

CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA,  
UTAH AND NEW MEXICO ...3.0127

AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262

### *Geophysical Instrumentation*

#### *Crustal Movement Detectors*

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

#### *Geodetic Instruments*

CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA,  
UTAH AND NEW MEXICO ...3.0127

#### *Geodetic Tiltmeters*

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

#### *Geothermal Instruments*

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
GRAM - WASHINGTON, OREGON AND CALIFORNIA  
...14.0008

#### *Gravimeters*

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

#### *Magnetometers*

MONTEREY BAY - CALIFORNIA ...3.0116

INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA  
...3.0117

#### *Seismic Tiltmeters*

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA  
...3.0117

EARTH STRUCTURE AND FAULT TECTONICS AS RE-  
LATED TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262

REGIONAL SEISMICITY AND TECTONICS OF THE  
SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH  
EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276

SATELLITE VOLCANO SURVEILLANCE - ALASKA,  
HAWAII AND WASHINGTON ...14.0002

### *Seismographs*

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUC-  
TURES TO THE SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 ...3.0014

COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTI-  
CAL STRUCTURES BASED ON SEISMOGRAMS FROM  
THE SAN FERNANDO EARTHQUAKE (ABBREV)  
...3.0048

NATIONAL EARTHQUAKE INFORMATION SERVICE  
...3.0051

MODIFICATION OF SEISMOGRAPH RECORDS FOR EF-  
FECTS OF LOCAL SOIL CONDITIONS ...3.0093

MICROEARTHQUAKE DATA ANALYSIS ...3.0119

CALTECH SEISMIC NETWORK AND SAN FERNANDO  
EARTHQUAKE STUDIES ...3.0139

A STUDY OF STRONG EARTHQUAKE GROUND MOTION  
USING AN ARRAY OF ACCELEROGRAPHS - CALIFOR-  
NIA ...3.0147

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21,  
1967 ...3.0221

EARTHQUAKES RECORDED BY A SEISMOGRAPH NET-  
WORK LOCATED IN THE SOUTHERN NEVADA RE-  
GION, JANUARY 1-DECEMBER 22, 1971 ...3.0246

ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMA-  
RY, OCTOBER 1972-APRIL 1973 ...3.0247

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262

### *Seismometers*

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

CRUSTAL DEFORMATION RELEASE, FAILURE AND  
TILTS IN ALASKA ...3.0070

SEISMICITY OF MENDOCINO ESCARPMENT-GORDA  
RIDGE REGION - CALIFORNIA ...3.0080

REGIONAL GEOLOGICAL FRAMEWORK, NORTH CEN-  
TRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

AUTOMATIC MICROEARTHQUAKE PROCESSING -  
CALIFORNIA ...3.0129

STRAINS AND TILTS ASSOCIATED WITH THE SAN FER-  
NANDO EARTHQUAKE ...3.0145



REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276  
SUBAUDIBLE ROCK NOISE (SARN) AS A MEASURE OF SLOPE STABILITY, CALIFORNIA ...9.0006  
TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA ...13.0011

#### *Strain Gauges*

INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA ...3.0117  
STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126  
STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE ...3.0145  
EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA ...3.0153  
EARTHQUAKES AND ACTIVE FAULTS ...3.0173  
REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276  
EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005  
GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA ...14.0006

#### *Geothermal Properties*

SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION ...3.0275  
SUBSIDENCE AND RELATED ASPECTS OF GEOTHERMAL SYSTEMS ...10.0017  
SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...14.0013  
REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII ...14.0014  
NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035

#### *Convection Currents*

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA ...14.0008

#### *Geothermal Gradient*

RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER ...3.0100  
AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA ...3.0264

#### *Temperature Logging*

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243

#### *Temperature Mapping*

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES ...14.0009

#### *Gravity Studies*

##### *Gravity Applications*

REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124

##### *Gravity Mapping*

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015

##### *Gravity Surveys*

HAWAIIAN VOLCANO OBSERVATORY ...3.0057  
MONTEREY BAY - CALIFORNIA ...3.0116  
SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO ...3.0182

#### *Magnetic Properties*

##### *Aeromagnetics*

NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE ...3.0174  
SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO ...3.0182

##### *Magnetic Applications*

NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE ...3.0174  
HAWAIIAN VOLCANO OBSERVATORY ...14.0004

##### *Magnetic Field Characteristics*

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180  
HAWAIIAN VOLCANO OBSERVATORY ...14.0004

##### *Magnetic Surveys*

MONTEREY BAY - CALIFORNIA ...3.0116  
SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO ...3.0182

STUDY FOR THE CITY OF OAKLAND, CALIF. ...9.0026  
 SAN FRANCISCO BAY ...15.0013

*Acoustics*

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015  
 ESTABLISH TECHNIQUES FOR MONITORING SURFACE SUBSIDENCE OVER MINED AREAS ...10.0023

*Aftershocks*

REPORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION ...3.0004

STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA EARTHQUAKE OF JUNE 21, 1967 ...3.0018

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...3.0047

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102

EARTHQUAKE MODELING ...3.0114

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...3.0122

CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES ...3.0139

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

SEISMICITY AND EARTH STRUCTURE ...3.0167

A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES ...3.0202

IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES ...3.0222

PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA- GLENDALE AREA ...3.0244

SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971 ...3.0246

SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES ...3.0261

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS ...3.0263

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION ...3.0277

RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI ...3.0240

DILATANCY AND PREMONITORY VARIATIONS OF P, S TRAVEL TIMES ...3.0248

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

*Crustal Thickness*

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

*Earth Tides*

EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA ...3.0153

RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI ...3.0240

*Earthquake Epicenter*

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA EARTHQUAKE OF JUNE 21, 1967 ...3.0018

SEISMIC RISK - FDAA - WASHINGTON AND UTAH ...3.0020

NATIONAL EARTHQUAKE INFORMATION SERVICE ...3.0051

EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA ...3.0071

THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129

STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE ...3.0145

THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT ...3.0160

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

SEISMICITY AND EARTH STRUCTURE ...3.0167

SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168

THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967 ...3.0221

ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972 ...3.0223

ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971 ...3.0224

A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE ...3.0236

GION, JANUARY 1-DECEMBER 22, 1971 ...3.0246  
ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973 ...3.0247  
SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES ...3.0268

REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION ...13.0008

THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL ...13.0026

#### *Earthquake Focus*

SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA ...3.0080

THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

MICROEARTHQUAKE DATA ANALYSIS ...3.0119

CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135

SEISMICITY AND EARTH STRUCTURE ...3.0167

A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES ...3.0202

A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE ...3.0236

TRAVEL-TIME TABLES FOR EARTHQUAKES IN THE CENTRAL UNITED STATES ...3.0239

RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI ...3.0240

ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973 ...3.0247

DILATANCY AND PREMONITORY VARIATIONS OF P, S TRAVEL TIMES ...3.0248

SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA ...3.0249

EARTHQUAKE DISTRIBUTION AND MECHANISM OF FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VALLEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA ...3.0250

MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE ...3.0258

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS ...3.0263

IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

SEISMIC ACTIVITY OF THE CASCADE VOLCANOES ...3.0283

#### *Earthquake Geography*

SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES ...3.0268

#### *Earthquake Location*

ENGINEERING SEISMOLOGY ...3.0019

NATIONAL EARTHQUAKE INFORMATION SERVICE ...3.0051

MICROEARTHQUAKE DATA ANALYSIS ...3.0119

RANGELY - CALIFORNIA ...3.0123

AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157

NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE ...3.0174

LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS ...3.0257

#### *Earthquakes*

PUGET PEAK AVALANCHE, ALASKA ...1.0007

EARTHQUAKES AND INSURANCE ...3.0001

STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A ...3.0002

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES ...3.0003

REPORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION ...3.0004

BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0005

VAN NORMAN RESERVOIRS AREA, CALIFORNIA ...3.0006

PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973 ...3.0007

COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION ...3.0008

BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0009

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS ...3.0010

DAMAGE ...3.0012  
ATION OF GROUND MOTION-DAMAGE RELA-  
PS FOR RESIDENTIAL BUILDINGS IN GLEN-  
CALIFORNIA- SAN FERNANDO EARTHQUAKE,  
RY 1 ...3.0013

OF TWO IDENTICAL SEVEN-STORY STRUC-  
TO THE SAN FERNANDO EARTHQUAKE OF  
RY 9, 1971 ...3.0014

CTIONS OF DAMAGE TO GLENDALE  
ING POOLS, MOBILE HOMES, AND COMMER-  
BUILDINGS RESULTING FROM SAN FERNANDO  
UAKE OF 1971 ...3.0015

SURVEY, SAN FERNANDO EARTHQUAKE OF  
RY 9, 1971 ...3.0017

EAL EFFECTS OF THE FAIRBANKS, ALASKA  
UAKE OF JUNE 21, 1967 ...3.0018

ING SEISMOLOGY ...3.0019

RISK - FDAA - WASHINGTON AND UTAH

ANCE OF SINGLE FAMILY DWELLINGS IN  
I FERNANDO EARTHQUAKE OF FEBRUARY 9,  
0021

NTO SELECTED AREAS OF ECONOMIC IM-  
P THE CALIFORNIA EARTHQUAKE FOR THE  
OF EMERGENCY PREPAREDNESS (ABBREV)

OF POWER SYSTEMS TO THE SAN FERNAN-  
LEY EARTHQUAKE OF 9 FEBRUARY 1971

N SEISMICITY AND EARTHQUAKE DAMAGE  
ICS, APPENDIX B ...3.0024

A ROSA, CALIFORNIA, EARTHQUAKES OF  
R 1, 1969 ...3.0025

STATISTICS FOR HIGH-RISE BUILDINGS IN  
VICINITY OF THE SAN FERNANDO  
UAKE ...3.0026

LE FATIGUE FAILURE OF SEISMIC STRUC-  
...3.0027

OF GROUND MOTIONS IN LOCAL  
UAKES ...3.0028

AKE RESPONSE OF GRAVITY DAMS INCLUD-  
ERVOIR INTERACTION ...3.0029

AKE ANALYSIS OF MULTISTORY BUILDINGS  
ING FOUNDATION INTERACTION ...3.0030

AKE RESPONSE OF CONCRETE GRAVITY  
...3.0031

ABSORPTION CHARACTERISTICS OF STRUC-  
SYSTEMS SUBJECTED TO EARTHQUAKE EX-  
N ...3.0032

IC INELASTIC RESPONSE OF OFFSHORE  
TO STRONG MOTION EARTHQUAKES

AKE RESPONSE OF AXISYMMETRIC TOWER  
URES SURROUNDED BY WATER ...3.0034

STRUCTURES ...3.0037

IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN  
...3.0038

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION  
SYSTEMS ...3.0041

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE  
ENGINEERING, SAN FERNANDO DATA PROCESSING  
...3.0042

GENERAL REVIEW OF THE SEISMIC HAZARD TO  
SELECTED U.S. NAVY INSTALLATIONS ...3.0044

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...3.0047

COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTI-  
CAL STRUCTURES BASED ON SEISMOGRAMS FROM  
THE SAN FERNANDO EARTHQUAKE (ABBREV)  
...3.0048

TSUNAMI RESEARCH ...3.0049

TETON DAM SEISMICITY - IDAHO ...3.0050

NATIONAL EARTHQUAKE INFORMATION SERVICE  
...3.0051

EARTHQUAKES RELATED TO RESERVOIR FILLING  
...3.0054

ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO  
EARTHQUAKE ...3.0055

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
...3.0056

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

QUASI-STATIC LATERAL DESIGN LOADS FOR  
EARTHQUAKE RESISTANT STRUCTURES ...3.0058

SEISMIC DESIGN OF LOW-RISE BUILDINGS ...3.0059

SHEAR MODULUS AND DAMPING IN SOILS - MEASURE-  
MENT AND PARAMETER EFFECTS ...3.0060

STRUCTURAL MODEL TESTS OF EARTHQUAKE EF-  
FECTS (ES 047) ...3.0065

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
DAMS ...3.0066

STABILITY AND DYNAMIC RESPONSE OF COOLING  
TOWERS ...3.0068

REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL RE-  
PORT ...3.0069

CRUSTAL DEFORMATION RELEASE, FAILURE AND  
TILTS IN ALASKA ...3.0070

THE UNPREDICTABLE DISASTER IN A METROPOLIS -  
PUBLIC RESPONSE TO THE LOS ANGELES  
EARTHQUAKE OF FEBRUARY, 1971 ...3.0074

EARTHQUAKE SAFETY OF SCHOOL BUILDINGS ...3.0075

ADAP - A COMPUTER PROGRAM FOR STATIC AND  
DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

- SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA ...3.0080
- CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFORMATION OF ENGINEERING MATERIALS ...3.0081
- ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085
- INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES ...3.0086
- THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087
- OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090
- DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING ...3.0091
- ACCELERATIONS IN ROCK FOR EARTHQUAKES IN THE WESTERN UNITED STATES ...3.0092
- MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS ...3.0093
- EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA ...3.0094
- ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0095
- A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097
- ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES ...3.0098
- STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099
- RECOMMENDATIONS DEVELOPED FROM REPORTS OF THE EARTHQUAKE COMMISSION AND EARTHQUAKE TASK FORCES - SAN FERNANDO EARTHQUAKE (AB-BREV) ...3.0101
- OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102
- SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103
- MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104
- EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION ...3.0107
- ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109
- FAULT ZONE TECTONICS (CREEP) - CALIFORNIA ...3.0110
- REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF BORREGO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-BREV) ...3.0113
- EARTHQUAKE MODELING ...3.0114
- EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115
- INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA ...3.0117
- ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...3.0122
- RANGELY - CALIFORNIA ...3.0123
- SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS ...3.0125
- STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126
- CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO ...3.0127
- EARTHQUAKE HAZARDS REDUCTION-NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128
- AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129
- SEISMIC SOURCE STUDIES - CALIFORNIA ...3.0130
- TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA ...3.0131
- ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA ...3.0132
- TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA ...3.0133
- CALIFORNIA M/EQ NET ...3.0134
- CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135
- APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA ...3.0136
- STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA ...3.0138
- CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES ...3.0139
- EARTHQUAKES AND INSURANCE - ERA CONFERENCE 2-3 APRIL 1973 ...3.0140
- MODAL COUPLING AND EARTHQUAKE RESPONSE OF TALL BUILDINGS ...3.0141
- EVALUATION OF THE INCREMENTAL SEISMIC RISK DUE TO RESERVOIR FILLING ...3.0142
- THREE-YEAR OPERATION OF THE UNIVERSITIES COUNCIL FOR EARTHQUAKE ENGINEERING RESEARCH ...3.0143
- FORCED VIBRATION OF A 22-STORY STEEL FRAME BUILDING ...3.0144
- STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE ...3.0145
- PUGET SOUND, WASHINGTON, EARTHQUAKE AND THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES ...3.0146
- A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147
- ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE ...3.0148
- THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151
- EARTH STRUCTURE AND FAULT TECTONICS AS RE-

- EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157
- FHA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH-RISE BUILDINGS ...3.0158
- ENG-AFTERSHOCK STUDIES - CALIFORNIA ...3.0159
- THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT ...3.0160
- A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS ...3.0161
- A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA ...3.0162
- RISK MAPS AND FIELD INVESTIGATIONS ...3.0163
- SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES ...3.0164
- VA. SEISMICITY - 32 STATES AND PUERTO RICO ...3.0165
- GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO ...3.0166
- SEISMICITY AND EARTH STRUCTURE ...3.0167
- SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168
- EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171
- EARTHQUAKES AND ACTIVE FAULTS ...3.0173
- NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE ...3.0174
- ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...3.0175
- DENVER METROPOLITAN AREA, COLORADO ...3.0176
- SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO ...3.0178
- EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...3.0179
- TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180
- SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO ...3.0182
- EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE ...3.0183
- HAMILTON 2 DEGREE ...3.0184
- SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...3.0185
- TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES ...3.0186
- BUILDING PRACTICES FOR DIASER MITIGATION ...3.0188
- STRENGTH OF EXISTING MASONRY WALLS ...3.0189
- DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...3.0191
- REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965 ...3.0196
- SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197
- PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...3.0198
- PROTECTION OF TRANSPORTATION FACILITIES AGAINST EARTHQUAKES ...3.0199
- REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES ...3.0200
- A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES ...3.0202
- EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203
- TECHNIQUES FOR RETROFITTING EXISTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE ...3.0204
- SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207
- PROBABILISTIC METHODS IN CIVIL ENGINEERING ...3.0208
- ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES ...3.0209
- RESPONSE AND ENERGY-DISSIPATION OF REINFORCED CONCRETE FRAMES SUBJECTED TO STRONG BASE MOTIONS ...3.0210
- EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS ...3.0211
- EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212
- PROBABILISTIC MODELING OF EXTREME LOADS ...3.0213
- PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES ...3.0215
- RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION ...3.0218
- ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS ...3.0220
- THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967 ...3.0221
- IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES ...3.0222
- ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972 ...3.0223
- ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971 ...3.0224
- SEISMIC RESEARCH ...3.0225
- SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM ...3.0226
- NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228
- SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229

- DYNAMIC AND STATIC LOADING ...3.0234
- SOME GROUND MOTION AND INTENSITY RELATIONS FOR THE CENTRAL UNITED STATES ...3.0235
- A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE ...3.0236
- MAGNITUDE RECURRENCE RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES ...3.0237
- THE RELATION BETWEEN FELT AREA AND MAGNITUDE FOR CENTRAL UNITED STATES EARTHQUAKES ...3.0238
- TRAVEL-TIME TABLES FOR EARTHQUAKES IN THE CENTRAL UNITED STATES ...3.0239
- RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI ...3.0240
- SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968 ...3.0241
- MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI ...3.0242
- PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA- GLENDALE AREA ...3.0244
- SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245
- EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971 ...3.0246
- ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973 ...3.0247
- SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA ...3.0249
- EARTHQUAKE DISTRIBUTION AND MECHANISM OF FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VALLEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA ...3.0250
- PROBABILITY OF FATIGUE FAILURE UNDER EARTHQUAKE LOADS ...3.0251
- A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING ...3.0252
- ADAPTIVE STRUCTURAL SYSTEMS ...3.0253
- SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254
- DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL SYSTEMS ...3.0255
- LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS ...3.0257
- EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION ...3.0260
- SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES ...3.0261
- SEISMIC REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES ...3.0268
- EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE ...3.0269
- REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA ...3.0270
- DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS ...3.0271
- EARTHQUAKES INDUCED BY UNDERGROUND FLUID INJECTION ...3.0272
- THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE ...3.0274
- SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION ...3.0275
- REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276
- SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION ...3.0277
- SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS ...3.0278
- A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280
- BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN ...3.0281
- SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS ...3.0282
- SEISMIC ACTIVITY OF THE CASCADE VOLCANOES ...3.0283
- DISASTER INVESTIGATIONS ...6.0001
- SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043
- TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION ...13.0008
- EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA ...13.0012
- RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018
- THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL ...13.0026
- SATELLITE VOLCANO SURVEILLANCE - ALASKA, HAWAII AND WASHINGTON ...14.0002
- VOLCANIC HAZARDS, ISLAND OF HAWAII ...14.0010
- RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID ...16.0019
- NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS ...16.0030

PLAN FOR NATURAL DISASTER WARNING  
PREPAREDNESS ...3.0071

3 PRACTICES FOR DISASTER MITIGATION

3 LUTION - EROSION EFFECTS IN SOIL ...3.0106

### *Fluid Injection*

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

EARTHQUAKE MONITORING IN LOS ANGELES  
...3.0104

EARTHQUAKE MODELING ...3.0114

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA

- CALIFORNIA ...3.0123

MICROEARTHQUAKE NETWORKS - ALABAMA  
AND TEXAS ...3.0125

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES  
IN DAMS ...3.0231

EXPERIMENTAL AND THEORETICAL STUDY OF THE  
PERMEABILITY-DIFFUSION MODEL FOR EARTHQUAKE  
PREDICTION ...3.0260

EARTHQUAKES INDUCED BY UNDERGROUND FLUID  
INJECTION ...3.0272

TEMPERATURE AND RELATED ASPECTS OF GEOTHERMAL  
SYSTEMS ...10.0017

### *Geographical Seismic Studies*

EARTHQUAKE RISK STUDY, TECHNICAL REPORT  
...3.0069

SEISMICITY - CALIFORNIA ...3.0118

CRITICAL SITE EVALUATIONS ...3.0177

STANDARDS AND THE EARTHQUAKE  
RISK FOR THE PUGET SOUND BASIN ...3.0281

SURVEILLANCE OF AUGUSTINE REDOUBT  
VOLCANOES, COOK INLET, ALASKA  
...3.0236

### *L Waves*

EARTHQUAKE STUDY OF THE LOWER MISSISSIPPI  
VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE  
...3.0236

ANALYSIS OF LONG PERIOD SURFACE WAVES IN  
THE STATE OF ALASKA ...3.0012

ENVIRONMENT - INVESTIGATIONS OF GENERATION  
OF OCEAN WAVES AND OF RESONANCE IN  
THE PORTS OF HARBORS TO TSUNAMIS AND OTHER  
LONG PERIOD WAVES ...3.0016

LONG PERIOD WAVES AND SURGES ...3.0019

NUMERICAL SIMULATION OF TSUNAMIS ...3.0020

APPLICATIONS IN DESIGN OF THE PROPOSED CRESCENT  
HARBOR TSUNAMI MODEL ...3.0026

### *Loading - Unloading*

STRUCTURAL FATIGUE FAILURE OF SEISMIC STRUCTURES  
...3.0027

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING  
RESERVOIR INTERACTION ...3.0029

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

EARTHQUAKE STABILITY OF REINFORCED EARTH  
STRUCTURES ...3.0037

TETON DAM SEISMICITY - IDAHO ...3.0050

COMPARISON OF COMPUTED AND MEASURED  
DYNAMIC RESPONSE OF MONTICELLO DAM ...3.0053

EARTHQUAKES RELATED TO RESERVOIR FILLING  
...3.0054

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
...3.0056

SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT  
AND PARAMETER EFFECTS ...3.0060

STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS  
(ES 047) ...3.0065

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
DAMS ...3.0066

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS  
...3.0067

STATIC AND EARTHQUAKE ANALYSIS OF THREE-  
DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS  
...3.0099

SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103

FAULT ZONE TECTONICS (CREEP) - CALIFORNIA  
...3.0110

SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA  
AND TEXAS ...3.0125

APPLICATION OF DECISION THEORY IN STRUCTURAL  
DESIGN FOR RESISTANCE TO LOADINGS GENERATED  
BY EARTHQUAKE PHENOMENA ...3.0136

APPLICATION OF PROBABILITY, STATISTICS AND DECISION  
THEORY IN SOIL ENGINEERING ...3.0137

EVALUATION OF THE INCREMENTAL SEISMIC RISK  
DUE TO RESERVOIR FILLING ...3.0142

EARTH STRUCTURE AND FAULT TECTONICS AS RELATED  
TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS  
UNITED STATES ...3.0164

GLEN CANYON AND AUBURN DAM SEISMICITY -  
COLORADO ...3.0166

STRENGTH OF EXISTING MASONRY WALLS ...3.0189

BUILDING PRACTICES FOR DISASTER MITIGATION  
...3.0192

A STUDY OF MICROEARTHQUAKES IN THE  
SOUTHEASTERN UNITED STATES ...3.0202

ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR  
SOILS DURING EARTHQUAKES ...3.0209

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
BUILDINGS ...3.0211

PROBABILISTIC MODELING OF EXTREME LOADS  
...3.0213

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES  
...3.0215

SHEAR MODULUS AND DAMPING IN SOILS - DESIGN  
EQUATIONS AND CURVES ...3.0216

SEISMIC RESEARCH ...3.0225



SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254  
 THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO  
 FATIGUE DAMAGE ...3.0274  
 SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CON-  
 DITIONS ...3.0278  
 SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN  
 AND WALL CONNECTIONS ...3.0282  
 FLOW SLIDE CONTROL WITH SLOPE REVETMENTS  
 ...9.0020

#### *Microseismology*

MICROEARTHQUAKE DATA ANALYSIS ...3.0119  
 EARTHQUAKES AND ACTIVE FAULTS ...3.0173  
 ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS  
 ...3.0220  
 A MICROEARTHQUAKE STUDY OF THE LOWER MISSIS-  
 SIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TEN-  
 NESSEE ...3.0236  
 MICROSEISMICITY AND TECTONICS OF THE NEVADA  
 SEISMIC ZONE ...3.0258  
 SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
 REGION ...3.0277  
 LOCATION OF SLOPE FAILURE PLANES ...9.0009  
 MICROSEISMIC DETERMINATION OF COAL MINE  
 ENTRY STABILITY ...10.0006  
 SUBSIDENCE AND RELATED ASPECTS OF GEOTHER-  
 MAL SYSTEMS ...10.0017

#### *Microseisms - Background Noise*

MICROEARTHQUAKE MONITORING IN LOS ANGELES  
 AREA ...3.0104  
 MICROEARTHQUAKE DATA ANALYSIS ...3.0119  
 SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA  
 AND TEXAS ...3.0125  
 AUTOMATIC MICROEARTHQUAKE PROCESSING -  
 CALIFORNIA ...3.0129  
 A STUDY OF MICROEARTHQUAKES IN THE  
 SOUTHEASTERN UNITED STATES ...3.0202  
 DENVER EARTHQUAKES ...3.0217  
 A MICROEARTHQUAKE STUDY OF THE LOWER MISSIS-  
 SIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TEN-  
 NESSEE ...3.0236  
 RESEARCH IN EARTH STRAINS AND FOCAL  
 MECHANISMS - MISSOURI ...3.0240  
 SPECTRAL CHARACTERISTICS AND STRESS DROP FOR  
 MICROEARTHQUAKES NEAR FAIRVIEW PEAK,  
 NEVADA ...3.0249  
 EARTHQUAKE DISTRIBUTION AND MECHANISM OF  
 FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VAL-  
 LEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA  
 ...3.0250  
 MEASUREMENTS FOR FAULT SLIP ON THE DENALI,  
 FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS,  
 ALASKA ...3.0259

SEISMICITY AND CONTEMPORARY TECTONICS OF THE  
 YELLOWSTONE PARK-HEBGEN LAKE REGION  
 ...3.0275

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
 REGION ...3.0277  
 LOCATION OF SLOPE FAILURE PLANES ...9.0009  
 MICROSEISMIC DETERMINATION OF COAL MINE  
 ENTRY STABILITY ...10.0006  
 SUBSIDENCE AND RELATED ASPECTS OF GEOTHER-  
 MAL SYSTEMS ...10.0017

#### *Nuclear Blast Detection*

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118  
 GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
 PLANNING, CALIFORNIA ...16.0055

#### *Nuclear Blast Effects*

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
 AS A MECHANISM FOR FAILURE OF MILITARY IN-  
 STALLATIONS ...3.0067  
 SEISMIC RESEARCH ...3.0225  
 NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

#### *Nuclear Devices*

SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW  
 RISE BUILDINGS - COLORADO ...3.0016  
 STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
 AS A MECHANISM FOR FAILURE OF MILITARY IN-  
 STALLATIONS ...3.0067  
 ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

#### *Nuclear Explosion*

THE EFFECTS OF HURRICANE CAMILLE ON INDUSTRY,  
 PUBLIC UTILITIES, AND PUBLIC WORKS OPERATIONS  
 ...8.0056

#### *Primary Waves*

SEISMICITY AND EARTH STRUCTURE ...3.0167  
 IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN  
 EARTHQUAKES ...3.0222  
 SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS  
 EARTHQUAKE OF NOVEMBER 9, 1968 ...3.0241  
 DILATANCY AND PREMONITORY VARIATIONS OF P, S  
 TRAVEL TIMES ...3.0248  
 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE  
 IN WESTERN WASHINGTON USING A SEISMIC  
 TELEMETRY NETWORK ...3.0280

#### *Q Waves*

SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE  
 RESPONSE ANALYSIS OF HORIZONTALLY LAYERED  
 SITES ...3.0035  
 DILATANCY AND PREMONITORY VARIATIONS OF P, S  
 TRAVEL TIMES ...3.0248

#### *Seismic Applications*

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES  
IN NEVADA, IN SUPPORT OF EARTHQUAKE CON-  
TROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
3.0180

#### *Seismic Energy*

STUDIES OF GROUND MOTIONS IN LOCAL  
EARTHQUAKES ...3.0028

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF  
MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040

THREE DIMENSIONAL STOCHASTIC MODELLING OF  
STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

A STUDY OF STRONG EARTHQUAKE GROUND MOTION  
USING AN ARRAY OF ACCELEROGRAPHS - CALIFOR-  
NIA 3.0147

SOME GROUND MOTION AND INTENSITY RELATIONS  
FOR THE CENTRAL UNITED STATES ...3.0235

PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA-  
GLENDALE AREA ...3.0244

SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF  
SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES  
3.0261

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC  
METHODS 3.0263

#### *Seismic Mapping*

SEISMIC RISK - FDAA - WASHINGTON AND UTAH  
...3.0020

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
3.0056

SANTA CRUZ COUNTY COOP ...3.0106

MONTEREY BAY - CALIFORNIA ...3.0116

AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157

ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

RESEARCH STUDIES AND REPORTS ON EARTHQUAKE  
HAZARDS REDUCTION ...3.0218

SEISMIC RISK STUDIES IN THE UNITED STATES ...3.0219

ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BUL-  
LETIN, MARCH 1971 ...3.0224

THE RELATION BETWEEN FELT AREA AND MAG-  
NITUDE FOR CENTRAL UNITED STATES  
EARTHQUAKES ...3.0238

SEISMICITY OF THE SOUTHERN NEVADA REGION,  
DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC  
METHODS ...3.0263

SEISMIC HAZARD REGIONALIZATION AND PROBABILI-  
TY OF FUTURE EARTHQUAKES IN THE UNITED  
STATES ...3.0268

#### *Seismic Measurements*

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUC-

STUDIES OF GROUND MOTIONS IN LOCAL  
EARTHQUAKES ...3.0028

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

TETON DAM SEISMICITY - IDAHO ...3.0050

EARTHQUAKES RELATED TO RESERVOIR FILLING  
...3.0054

EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO  
BAY REGION ...3.0107

REGIONAL TECTONIC ANALYSIS - SAN ANDREAS  
FAULT - INVESTIGATION OF BORREGO MOUNTAIN  
EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-  
BREV) ...3.0113

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

RANGELY - CALIFORNIA ...3.0123

SEISMIC SOURCE STUDIES - CALIFORNIA ...3.0130

TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND  
NEVADA ...3.0133

CALTECH SEISMIC NETWORK AND SAN FERNANDO  
EARTHQUAKE STUDIES ...3.0139

EARTH STRUCTURE AND FAULT TECTONICS AS RE-  
LATED TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

MEASUREMENT OF MOVEMENT ON THE SAN AN-  
DREAS FAULT ...3.0155

GLEN CANYON AND AUBURN DAM SEISMICITY -  
COLORADO ...3.0166

ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BUL-  
LETIN, MARCH 1972 ...3.0223

MAGNITUDE RECURRENCE RELATION FOR CENTRAL  
MISSISSIPPI VALLEY EARTHQUAKES ...3.0237

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC  
METHODS ...3.0263

SEISMICITY INVESTIGATIONS IN THE CASCADE MOUN-  
TAINS AND VICINITY, OREGON, 1 MAY 1969 - 30  
APRIL 1970 ...3.0266

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
REGION ...3.0277

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE  
IN WESTERN WASHINGTON USING A SEISMIC  
TELEMETRY NETWORK ...3.0280

COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004

MICROSEISMIC DETERMINATION OF COAL MINE  
ENTRY STABILITY ...10.0006

SATELLITE VOLCANO SURVEILLANCE - ALASKA,  
HAWAII AND WASHINGTON ...14.0002

#### *Seismic Motion*

STUDIES OF GROUND MOTIONS IN LOCAL  
EARTHQUAKES ...3.0028

THREE DIMENSIONAL STOCHASTIC MODELLING OF  
STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

ENGINEERING SEISMOLOGY ...3.0019

NATIONAL EARTHQUAKE INFORMATION SERVICE ...3.0051

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA ...3.0070

INSTALLATION AND OPERATION OF A TELEMETERED SEISMIC NETWORK ON THE ALASKA PENINSULA ...3.0072

MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

MICROEARTHQUAKE DATA ANALYSIS ...3.0119

SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS ...3.0125

STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126

AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129

CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES ...3.0139

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA ...3.0153

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

SEISMICITY AND EARTH STRUCTURE ...3.0167

SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168

ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS ...3.0220

THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967 ...3.0221

IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES ...3.0222

ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972 ...3.0223

ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971 ...3.0224

SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968 ...3.0241

SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971 ...3.0246

ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973 ...3.0247

SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA ...3.0249

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970 ...3.0266

REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION ...3.0277

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETER NETWORK ...3.0280

SEISMIC ACTIVITY OF THE CASCADE VOLCANOES ...3.0283

SEISMIC SURVEILLANCE OF AUGUSTINE REDOUBT AND SPURR VOLCANOES, COOK INLET, ALASKA ...14.0005

GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA ...14.0006

### *Seismic Strain*

STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126

SEISMIC SOURCE STUDIES - CALIFORNIA ...3.0130

AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180

SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM ...3.0226

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

### *Seismic Stress*

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION ...3.0029

CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA ...3.0070

SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103

MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104

REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF BORREGO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-BREV) ...3.0113

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115

CALIFORNIA M/EQ NET ...3.0134

STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA ...3.0138

STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE ...3.0145

EARTH STRUCTURE AND FAULT TECTONICS AS RE-

SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES ...3.0261

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS ...3.0263

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA ...3.0264

SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION ...3.0275

REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276

COAL MINE DEFORMATION STUDIES, SOMERSET, COLORADO ...10.0004

SUBSIDENCE AND RELATED ASPECTS OF GEOTHERMAL SYSTEMS ...10.0017

#### *Seismic Surveys*

ENGINEERING SEISMOLOGY ...3.0019

MONTEREY BAY - CALIFORNIA ...3.0116

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970 ...3.0266

SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION ...3.0275

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION ...3.0277

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...9.0045

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015

#### *Seismic Travel Time*

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042

THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129

CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135

PUGET SOUND, WASHINGTON, EARTHQUAKE AND THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES ...3.0146

SEISMICITY AND EARTH STRUCTURE ...3.0167

ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972 ...3.0223

DILATANCY AND MONITORING VARIATIONS OF P, S TRAVEL TIMES ...3.0248

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION ...13.0008

LONG-PERIOD WAVES AND SURGES ...13.0019

#### *Seismic Wave Amplitude*

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES ...3.0056

INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE ...3.0083

THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

AUTOMATIC MICROEARTHQUAKE PROCESSING CALIFORNIA ...3.0129

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES ...3.0164

IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES ...3.0222

ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972 ...3.0223

ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971 ...3.0224

SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA ...3.0249

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

SEISMIC ACTIVITY OF THE CASCADE VOLCANOES ...3.0283

THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING DEPTH - OFF-SHORE BEHAVIOR ...13.0029

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### *Seismic Wave Frequency*

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION ...3.0029

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040

INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE ...3.0083

RANGELY - CALIFORNIA ...3.0123

HAZARDS IN THE UNITED STATES. REPORT 1. ...3.0233

SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA ...3.0249

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

#### *Seismic Wave Magnitude*

SEISMIC RISK - FDAA - WASHINGTON AND UTAH ...3.0020

STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES ...3.0028

ACCELERATIONS IN ROCK FOR EARTHQUAKES IN THE WESTERN UNITED STATES ...3.0092

EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA ...3.0094

AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129

CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE ...3.0154

THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT ...3.0160

RISK MAPS AND FIELD INVESTIGATIONS ...3.0163

SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES ...3.0164

SEISMICITY AND EARTH STRUCTURE ...3.0167

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180

THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967 ...3.0221

IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES ...3.0222

ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971 ...3.0224

SOME GROUND MOTION AND INTENSITY RELATIONS FOR THE CENTRAL UNITED STATES ...3.0235

MAGNITUDE RECURRENCE RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES ...3.0237

THE RELATION BETWEEN FELT AREA AND MAGNITUDE FOR CENTRAL UNITED STATES EARTHQUAKES ...3.0238

SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES ...3.0268

...3.0050

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...3.0067

MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS ...3.0093

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION ...3.0277

TSUNAMI RESEARCH ...13.0005

TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS ...13.0015

NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES ...13.0016

LONG-PERIOD WAVES AND SURGES ...13.0019

THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING DEPTH - OFF-SHORE BEHAVIOR ...13.0029

#### *Seismic Wave Velocity*

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042

ACCELERATIONS IN ROCK FOR EARTHQUAKES IN THE WESTERN UNITED STATES ...3.0092

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115

PUGET SOUND, WASHINGTON, EARTHQUAKE AND THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES ...3.0146

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

SEISMICITY AND EARTH STRUCTURE ...3.0167

STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT 1. ...3.0233

THE RELATION BETWEEN FELT AREA AND MAGNITUDE FOR CENTRAL UNITED STATES EARTHQUAKES ...3.0238

SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968 ...3.0241

SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

DILATANCY AND PREMONITORY VARIATIONS OF P, S TRAVEL TIMES ...3.0248

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION ...3.0277

### *Structural Studies*

- MICROEARTHQUAKE DATA ANALYSIS ...3.0119
- EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA ...3.0153
- TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180

### *Surface Waves*

- STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES ...3.0028
- A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE ...3.0236
- A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262
- EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA ...13.0012

### *Teleseismology*

- CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA ...3.0070
- INSTALLATION AND OPERATION OF A TELEMETERED SEISMIC NETWORK ON THE ALASKA PENINSULA ...3.0072
- AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129
- CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES ...3.0139
- A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

### *Wave Attenuation*

- STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES ...3.0028
- ACCELERATIONS IN ROCK FOR EARTHQUAKES IN THE WESTERN UNITED STATES ...3.0092
- SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES ...3.0164
- SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES ...3.0268
- REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA ...3.0270

### *Wave Dispersion*

- IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES ...3.0222

- ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118
- ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES ...3.0209
- SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM ...3.0226

## **Geosynclines**

*See Structural Geology  
Tectonic Features*

## **Geothermal**

*See Energy Conversion  
Natural Energy Sources*

## **Glaciology**

### **GLACIAL FEATURES**

#### *Cirques*

- PUGET PEAK AVALANCHE, ALASKA ...1.0007

#### *Depositional Features*

- SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043

#### *Erosional Features*

- SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

#### *Outwash Plains*

- SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043

### **ICE STUDIES**

- SHORE EROSION STUDY OF ERIE COUNTY, OHIO ...15.0030

#### *Ice Acoustics*

- ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-FN ...1.0004
- ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION ...1.0005

#### *Ice Alteration*

- THERMAL SURVEILLANCE OF ACTIVE VOLCANOES ...14.0009

TECHNIQUES ...6.0165  
DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165  
E HYDROLOGY ...6.0207

#### *Ice Mechanical Properties*

SLAB AVALANCHE STUDIES, 1971-1972 ...1.0001  
ACUSTIC EMISSION AND RELATED PROPERTIES OF  
OW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION ...1.0005  
W PACK STABILITY INDICES RELATIVE TO THE  
IMAX AVALANCHE ...1.0013  
E HYDROLOGY ...6.0207

#### *Ice Thermal Properties*

ORMAL SURVEILLANCE OF ACTIVE VOLCANOES  
4.0009

#### *Snow Studies*

##### *Drifting Snow*

TER YIELD IMPROVEMENT AND AVALANCHE  
ZARD PREDICTION IN ALPINE AREAS OF THE  
CKY MOUNTAINS ...1.0011

##### *Snow Composition*

E HYDROLOGY ...6.0207

##### *Snow Density*

TER YIELD IMPROVEMENT AND AVALANCHE  
ZARD PREDICTION IN ALPINE AREAS OF THE  
CKY MOUNTAINS ...1.0011

SICAL PROPERTIES OF ALPINE SNOW AS RELATED  
O WEATHER AND AVALANCHE CONDITIONS  
.0012

W PACK STABILITY INDICES RELATIVE TO THE  
IMAX AVALANCHE ...1.0013

#### *Snow Mechanical Properties*

USTIC EMISSION AND RELATED PROPERTIES OF  
OW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION 11042-EN ...1.0004

USTIC EMISSION AND RELATED PROPERTIES OF  
OW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION ...1.0005

SICAL PROPERTIES OF ALPINE SNOW AS RELATED  
WEATHER AND AVALANCHE CONDITIONS  
.0012

#### *Snow Metamorphism*

USTIC EMISSION AND RELATED PROPERTIES OF  
OW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION 11042-EN ...1.0004

USTIC EMISSION AND RELATED PROPERTIES OF  
OW APPLIED TO THE DETERMINATION OF SLAB  
AVALANCHE INITIATION ...1.0005

*See Electronic Systems*  
*Communication Systems*

## **Government**

*See Social Sciences*

## **Government Expenditures**

*See Economics*  
*Income Analysis*

## **Grain Size and Distribution**

*See Soil Science and Mechanics*  
*Physical Properties*

## **Granite**

*See Igneous Rocks*

## **Granular**

*See Soil Science and Mechanics*  
*Soil Types*

## **Graphical**

*See Engineering Mechanics*  
*Analysis*

## **Grasslands**

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA ...5.0013  
FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX  
FIRE - MINNESOTA ...5.0016

## **Gravimeters**

*See Geophysics*  
*Geophysical Instrumentation*

## **Gravity Dams**

*See Hydraulics*

## Gravity Studies

*See Geophysics*

## Groins

*See Hydraulics*

## Groundwater

*See Water Types*

## Groundwater Movement

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243

HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R ...10.0018

## Habitat Studies

*See Ecology*

## Hail and Sleet

*See Meteorology*  
*Meteorological Precipitation*

## Halides

*See Minerals*

## Harbors

*See Also Hydraulics*

SACHOSETTS ...8.0036

WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION ...8.0041

WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION ...8.0042

GALVESTON BAY HURRICANE SURGE - REPORT I - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION ...13.0009

STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION ...13.0010

NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES ...13.0016

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...13.0017

LONG-PERIOD WAVES AND SURGES ...13.0019

THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL ...13.0026

A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL ...13.0027

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK COUNTY, LONG ISLAND, NEW YORK, BETWEEN ORIENT POINT AND PORT JEFFERSON HARBOR ...15.0028

## Heat and Cooling Devices

*See Mechanical Power & Equipment*

## Heat and Thermodynamics

### HEAT TRANSMISSION

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0045

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES ...5.0046



WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

## **THERMODYNAMIC RELATIONS**

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUD-  
ING RESERVOIR INTERACTION ...3.0029

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

## **Heat Budget**

*See Meteorology*

## **Heat Flows**

*See Geophysics*  
*Geothermal Properties*

## **Heat Transmission**

*See Heat and Thermodynamics*

## **Helicopters**

*See Transportation Engineering*  
*Transportation Systems*

## **High-rise**

*See Buildings & Land Development*  
*Building Classification*

## **Highway Classification**

*See Transportation Engineering*

## **Highway Emergency**

*See Transportation Engineering*  
*Traffic Engineering*

## **Highway Structures**

*See Mechanics of Structures*

## **Hiking**

*See Recreation*  
*Recreation Activities*

## **FAMILY HOUSING CONSTRUCTION**

MILTON SOUTH, MILTON NORTH AND TURBOT  
TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS,  
PENNSYLVANIA ...6.0027

## **HOME MANAGEMENT**

SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESER-  
VOIR ...6.0360

## **Hospital & Medical Facilities**

### **HOSPITAL PERSONNEL & STAFFING**

MILITARY BLOOD BANKING (CIVIL DISASTERS)  
...16.0007

### **HOSPITAL SERVICES & UNITS**

#### *Emergency Service*

MILITARY BLOOD BANKING (CIVIL DISASTERS)  
...16.0007

HELICOPTER AMBULANCE SERVICE TO EMERGENCIES  
...16.0012

SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY  
...16.0018

DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMER-  
GENCY MEDICAL CARE, IN THE METROPOLITAN  
NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023

#### *Outpatient Clinic*

SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY  
...16.0018

## **Hospitals**

*See Buildings & Land Development*  
*Building Classification*

## **Housing**

*See Urban Research*

## **Humidity - Water Vapor**

*See Meteorology*

## **Hurricanes - Tropical Cyclones**

*See Meteorology*  
*Atmosphere Disturbance*

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
...3.0056

EARTHQUAKES AND ACTIVE FAULTS ...3.0173

HYDROLOGIC STUDIES (STORM STUDIES) ...6.0095

COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
...6.0148

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE  
OF THE LOWER MINNESOTA RIVER WATERSHED DIS-  
TRICT ...6.0302

COST-EFFECTIVENESS ANALYSES OF REGIONAL  
FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

STREAMFLOW SIMULATION AND FLOOD PROFILE  
DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS  
...6.0383

PILOT STUDY OF FLOOD PLAIN MANAGEMENT -  
WASHINGTON ...6.0402

THE USE OF DETAILED SOILS INFORMATION FOR  
DELINEATING AND REGULATING FLOOD PLAINS -  
LEGAL AND ADMINISTRATIVE CONSIDERATIONS  
...6.0413

GALVESTON BAY HURRICANE SURGE - REPORT (2) EF-  
FECTS OF PROPOSED BARRIERS ON TIDES, CUR-  
RENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
...8.0046

EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HUR-  
RICANE SURGE CONTROL STRUCTURES AND MISSIS-  
SIPPI RIVER-GULF OUTLET CHANNEL ...8.0048

PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT  
II DATA (WAVE FORCES ON A PILE), HURRICANE  
CARLA, GULF OF MEXICO ...8.0051

HYDRAULIC EROSION OF SOILS ...15.0012

COASTAL ENGINEERING STUDIES RELATED TO  
FLORIDA'S SHORELINE AND BEACH EROSION  
PROBLEMS ...15.0016

#### AQUEDUCTS

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

#### ARTIFICIAL ISLANDS

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

#### BEACH HYDRAULICS

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO  
BAY REGION - CALIFORNIA ...3.0109

...15.0001  
JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL  
AND HURRICANE PROTECTION ...15.0007

STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
RICANE PROTECTION PROJECT, STATEN ISLAND,  
NEW YORK ...15.0009

BEACH EROSION PROJECT, DELAWARE COAST PRO-  
TECTION PROJECT, DELAWARE ...15.0010

VIRGINIA BEACH, VIRGINIA - BEACH EROSION CON-  
TROL AND HURRICANE PROTECTION ...15.0011

COASTAL WORKS EVALUATION - CALIFORNIA,  
FLORIDA ...15.0015

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
ORIENT POINT AND PORT JEFFERSON HARBOR  
...15.0028

PROPERTIES AND STABILITY OF A TEXAS BARRIER  
BEACH INLET ...15.0035

#### BREAKWATERS

DESIGN FOR FLOOD CONTROL AND WAVE PROTEC-  
TION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAU-  
LIC MODEL INVESTIGATION ...6.0116

WAVE AND SURGE CONDITIONS AFTER PROPOSED EX-  
PANSION OF MONTEREY HARBOR, MONTEREY,  
CALIFORNIA - HYDRAULIC MODEL INVESTIGATION  
...8.0041

WAVE AND SURGE ACTION, MONTEREY HARBOR,  
MONTEREY, CALIFORNIA - MODEL INVESTIGATION  
...8.0042

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
...15.0001

#### BULKHEADS

A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL  
LIQUEFACTION POTENTIAL ...3.0097

BEACH EROSION PROJECT, DELAWARE COAST PRO-  
TECTION PROJECT, DELAWARE ...15.0010

#### CHANNELS

PEAK DISCHARGE AND FREQUENCY FOR SMALL  
WATERSHEDS IN COLORADO ...6.0049

CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS  
RELATING TO CHANNEL DEVELOPMENT, EROSION,  
& BANK & LEVEE PROTECTION ...6.0053

DESIGN FOR FLOOD CONTROL AND WAVE PROTEC-  
TION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAU-  
LIC MODEL INVESTIGATION ...6.0116

METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161  
 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392  
 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION ...8.0043  
 PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035

## CITUES

FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS ...6.0120

## COASTAL ENGINEERING

STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES ...3.0033  
 LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT ...6.0098  
 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119  
 GALVESTON BAY HURRICANE SURGE - REPORT 2 - EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038  
 GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039  
 GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION ...8.0040  
 GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045  
 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION ...13.0009  
 STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION ...13.0010  
 BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE ...15.0010

## CONDUITS

BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0005

LAPOURCHE - LOUISIANA (ABBREV) ...6.0096  
 NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION ...6.0097  
 LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT ...6.0098  
 BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141  
 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV) ...8.0012  
 LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012  
 COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION ...15.0001  
 JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0007

## CULVERTS

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049  
 FLOOD PROTECTION AT CULVERT OUTLETS ...6.0050  
 CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074  
 FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075  
 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079  
 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082  
 FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091  
 FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094  
 SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122  
 APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT ...6.0125  
 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134  
 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135  
 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136  
 STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149  
 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY ...6.0312

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344

FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415

#### DAMS

REPORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION ...3.0004

VAN NORMAN RESERVOIRS AREA, CALIFORNIA ...3.0006

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS ...3.0036

ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0095

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO ...3.0166

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME I ...6.0015

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME II, APPENDICES ...6.0040

FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA ...6.0062

SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115

SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

NUTWOOD WATERSHED, ILLINOIS ...6.0199

ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272

FORT SCOTT LAKE, MARMATON RIVER, KANSAS ...6.0315

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY ...6.0322

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...6.0341

#### Arch Dams

COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM ...3.0053

STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047) ...3.0065

ADAP - A COMPUTER PROGRAM FOR STATIC AND DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

#### Earth Dams

EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES ...3.0037

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS ...3.0066

EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS ...3.0231

FLOOD WAVES FROM A CONTROLLED BREACHED DAM ...6.0124

MACADOO ROAD-FILL DAM, KANSAS ...6.0203

RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A REVIEW OF PRACTICES AND PROCEDURES ...9.0008

#### Gravity Dams

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION ...3.0029

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS ...3.0031

#### Rockfill Dams

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS ...3.0066

EVALUATION OF THE INCREMENTAL SEISMIC RISK DUE TO RESERVOIR FILLING ...3.0142

EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171

...6.0058  
 STUDIES OF THE RED ALGAE IN BISCAYNE BAY ...6.0070  
 ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT ...6.0072  
 FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075  
 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082  
 FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094  
 SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149  
 SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172  
 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180  
 ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244  
 FLOOD PROFILES OF IOWA STREAMS ...6.0274  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344  
 AN EVALUATION OF HURRICANE AGNES FLOODS IN COMPARISON TO BRIDGE DESIGN INFORMATION AVAILABLE FOR PENNSYLVANIA CONTEMPORANEOUSLY ...6.0355  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366  
 INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371  
 STORM CHARACTERISTICS AND RAINFALL INTENSITY IN WEST VIRGINIA ...6.0406  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
 STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415  
 INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE ...9.0018

MASSACHUSETTS ...6.0110  
 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION ...6.0117  
 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION ...6.0118  
 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION ...8.0043  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### DISCHARGE

THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018  
 FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO ...6.0020  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049  
 PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
 COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064  
 FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI ...6.0065  
 AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066  
 HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA ...6.0069  
 CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074  
 A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080  
 BRIDGE SITE INVESTIGATIONS ...6.0114  
 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION ...6.0117  
 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION ...6.0118  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138

SMALL WATERSHEDS IN OREGON ...6.0102  
HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALABAMA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

SPECIAL FLOOD DATA COLLECTION, HAWAII ...6.0249  
DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS ...6.0255

FLOOD FREQUENCY STUDY ILLINOIS ...6.0256

FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS ...6.0261

HYDRAULICS OF SHALLOW FLOWS OVER STABLE ERODED SAND SURFACES DEFINED BY AREA SPEC-TRA ...6.0269

FLOOD PROFILES OF IOWA STREAMS ...6.0274

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0280

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297

MISSISSIPPI BASIN MODEL ...6.0313

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA ...6.0321

FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY ...6.0325

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366

FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370

INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS ...6.0394

FLOOD INUNDATION STUDY, WISCONSIN ...6.0409

FLOOD INVESTIGATIONS IN WYOMING ...6.0414

STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415

#### *Annual Discharge*

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES ...6.0019

FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023

FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106

STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140

FLOOD INVESTIGATIONS - TENNESSEE ...6.0147

HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149

FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176

SMALL STREAM FLOOD CHARACTERISTICS ...6.0193

PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT ...6.0210

WATER RESOURCES INVESTIGATIONS ...6.0216

MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO ...6.0254

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349

EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA ...6.0361

EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374

EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA ...6.0376

URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384

FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON ...6.0403

...6.0388  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS  
 ...6.0389  
 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
 THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
 SIN ...6.0408

#### DIVERSION CHANNELS

SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT,  
 EAST TWIN AND WARM CREEK IMPROVEMENT  
 ...6.0172  
 STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
 RICANE PROTECTION PROJECT, STATEN ISLAND,  
 NEW YORK ...15.0009

#### DRAINAGE STRUCTURE

FLOOD FLOWS FROM SMALL DRAINAGE AREAS  
 ...6.0058  
 GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE  
 PROTECTION ASSOCIATED WATER FEATURE, BAYOU  
 LAFOURCHE - LOUISIANA (ABBREV) ...6.0096  
 FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND  
 ...6.0102  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR  
 SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 FLOOD INVESTIGATIONS - TENNESSEE ...6.0147  
 PORT ARTHUR HURRICANE FLOOD PROTECTION,  
 PORT ARTHUR AND VICINITY, TEXAS ...6.0152  
 FLOODWAY EVALUATIONS BEFORE & AFTER CHAN-  
 NEL MODIFICATIONS ASSUMING TOTAL  
 METROPOLITAN DEVELOPMENT IN DRAINAGE  
 BASINS JEFFERSON COUNTY, ALABAMA ...6.0161  
 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
 ...6.0187  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
 DRAINAGE AREAS IN FLORIDA ...6.0233  
 ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
 NOFF CHARACTERISTICS - GEORGIA ...6.0244  
 URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN  
 MANAGEMENT, SANITARY SEWERAGE, SOLID  
 WASTE MANAGEMENT (ABBREV) ...6.0307  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
 & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR  
 REVISION AND EXPANSION ...6.0330  
 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
 TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
 AURORA, N.Y. ...6.0332

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071  
 BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORA-  
 TION, BEACH EROSION CONTROL AND HURRICAN  
 PROTECTION PROJECT, DADE COUNTY, FLORID.  
 ...15.0006  
 BEACH EROSION PROJECT, DELAWARE COAST PRO-  
 TECTION PROJECT, DELAWARE ...15.0010  
 ENVIRONMENTAL GEOMORPHIC STUDY OF TH  
 COASTAL REGIMES ALONG THE SOUTH SHORE C  
 LONG ISLAND - NEW YORK ...15.0027  
 EROSION AND DEPOSITION IN THE SOUNDS AN  
 ESTUARIES OF THE NORTH CAROLINA COA  
 ...15.0029

#### ENERGY LOSS

GALVESTON BAY HURRICANE SURGE - REPORT 1 - E-  
 FECTS OF PROPOSED BARRIERS ON HURRICAN  
 SURGE HEIGHTS (ABBREV) ...8.0045

#### EROSION CONTROL

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISC  
 BAY REGION - CALIFORNIA ...3.0109  
 FLOOD PROTECTION AT CULVERT OUTLETS ...6.0050  
 CHENA RIVER LAKES PROJECT, ALASKA - PROBLEM  
 RELATING TO CHANNEL DEVELOPMENT, EROSION  
 & BANK & LEVEE PROTECTION ...6.0053  
 FLOOD WAVES FROM A CONTROLLED BREACHE  
 DAM ...6.0124  
 LAKE HYDROLOGY ...6.0207  
 COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
 ...15.0001  
 JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL  
 AND HURRICANE PROTECTION ...15.0007  
 STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
 RICANE PROTECTION PROJECT, STATEN ISLAND,  
 NEW YORK ...15.0009  
 BEACH EROSION PROJECT, DELAWARE COAST PRO-  
 TECTION PROJECT, DELAWARE ...15.0010  
 VIRGINIA BEACH, VIRGINIA - BEACH EROSION CON-  
 TROL AND HURRICANE PROTECTION ...15.0011  
 COASTAL WORKS EVALUATION - CALIFORNIA,  
 FLORIDA ...15.0015  
 A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
 FLORIDA ...15.0017  
 GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
 COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
 ORIENT POINT AND PORT JEFFERSON HARBOR  
 ...15.0028

GATUCK AND HOUSATONIC RIVERS, CONNECTICUT -  
HYDRAULIC MODEL INVESTIGATION ...6.0118  
HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE  
AREAS IN TEXAS ...6.0149  
MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
DRAINAGE AREAS IN FLORIDA ...6.0233  
FLOOD PROFILES OF IOWA STREAMS ...6.0274  
INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
DAKOTA ...6.0366  
FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
DISCHARGE CHARACTERISTICS OF HURRICANE BAR-  
RIERS, WAREHAM-MARION, MASSACHUSETTS -  
HYDRAULIC MODEL INVESTIGATION ...8.0043

#### Flow Characteristics

A STATISTICAL SUMMARY OF THE CAUSE AND COST  
OF BRIDGE FAILURES ...6.0016  
STUDIES IN CONNECTION WITH HYDROLOGIC AND RE-  
LATED PHYSICAL PROCESSES IN THE OLYMPUS  
COVE AREA OF SALT LAKE COUNTY ...6.0031  
EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039  
INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060  
FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062  
COLLECTION AND ANALYSIS OF STREAM FLOW AND  
RELATED HYDRAULIC DATA FOR DESIGN OF  
HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064  
ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER  
MANAGEMENT ...6.0072  
LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085  
STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090  
FLOOD INVESTIGATIONS - HIGHWAY COMMISSION -  
KANSAS ...6.0091  
STREAMFLOW PATTERNS WATERSHED CHARAC-  
TERISTICS THROUGH USE OF OPSET - A SELF  
CALIBRATING VERSION OF STANFORD WATERSHED  
MODEL (ABBREV) ...6.0092  
FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN  
MASSACHUSETTS ...6.0106  
ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAU-  
GATUCK AND HOUSATONIC RIVERS, CONNECTICUT -  
HYDRAULIC MODEL INVESTIGATION ...6.0118  
OPTIMIZATION OF OPERATION OF A SYSTEM OF  
FLOOD CONTROL RESERVOIRS ...6.0123  
FLOOD WAVES FROM A CONTROLLED BREACHED  
DAM ...6.0124  
MAGNITUDE AND FREQUENCY OF FLOOD  
DISCHARGES FROM SMALL DRAINAGE BASINS, EF-  
FECTS OF DRAINAGE BASIN CHARACTERISTICS -  
NORTH DAKOTA ...6.0138

INVESTIGATION OF SMALL WATERSHEDS IN OKLAHOMA ...6.0217  
MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL  
DRAINAGE BASINS IN IDAHO ...6.0254  
DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255  
NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES,  
MACON COUNTY, ILLINOIS ...6.0258  
STREAMFLOW VARIABILITY - ILLINOIS ...6.0263  
FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN VERMONT ...6.0296  
FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN RHODE ISLAND ...6.0297  
DEMONSTRATION OF THE ELECTRIC ANALOG MODEL  
OF THE KANSAS RIVER AT THE UNIVERSITY OF  
CALIFORNIA IN BERKELEY ...6.0314  
HYDROLOGY OF STREAMS IN ST. LOUIS  
METROPOLITAN AREA ...6.0317  
HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS-  
SOURI ...6.0319  
FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
STUDIES IN THE ANALYSIS OF METROPOLITAN WATER  
RESOURCE SYSTEMS - VOLUME IV - MODELS FOR  
MANAGING METROPOLITAN SURFACE WATER  
SYSTEMS ...6.0335  
COMPARISON OF RECENTLY PUBLISHED FORMULAE  
FOR FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356  
INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
DAKOTA ...6.0366  
MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH  
...6.0392  
NUMERICAL STUDIES OF UNSTEADY FLOW IN THE  
JAMES RIVER - VIRGINIA ...6.0396  
FLOOD PROFILES AND INUNDATED AREAS ALONG  
THE LOWER NISQUALLY RIVER, WASHINGTON  
...6.0403  
FLOOD PROFILES AND INUNDATED AREAS ALONG  
THE SKOKOMISH RIVER, WASHINGTON ...6.0404  
FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415

#### Flow Types - Natural Water

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

#### Artesian Flow

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230  
LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
STUDY THE EXTENT, MAGNITUDE R ...10.0018



THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018

STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090

FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160

SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172

SMALL STREAM FLOOD CHARACTERISTICS ...6.0193

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

TRAVEL TIME OF GEORGIA STREAMS ...6.0241

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION ...6.0271

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396

#### *Open Channel Flow*

SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220

#### *Peak Flow*

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES ...6.0019

FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO ...6.0020

FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023

STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034

EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061

COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064

FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075

INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL ...6.0088

FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091

STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV) ...6.0092

FLOOD-FREQUENCY STUDY - KENTUCKY ...6.0093

FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094

FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102

FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106

SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115

DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION ...6.0117

APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT ...6.0125

INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136

MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138

STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140

FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS ...6.0146

FLOOD INVESTIGATIONS - TENNESSEE ...6.0147

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

RUNOFF SIMULATION ...6.0156

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176

SMALL STREAM FLOOD CHARACTERISTICS ...6.0193  
 PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT ...6.0210  
 FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0214  
 FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215  
 WATER RESOURCES INVESTIGATIONS ...6.0216  
 INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0217  
 GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233  
 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234  
 THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242  
 ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244  
 SPECIAL FLOOD DATA COLLECTION, HAWAII ...6.0249  
 FLOOD PLAIN MAPPING IN HAWAII ...6.0250  
 SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251  
 MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO ...6.0254  
 DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS ...6.0255  
 FLOOD FREQUENCY STUDY ILLINOIS ...6.0256  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
 FLOOD PROFILES OF IOWA STREAMS ...6.0274  
 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0275  
 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276  
 FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA ...6.0277  
 EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282  
 SMALL STREAMS FLOOD FREQUENCY IN MAINE ...6.0287  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297  
 DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316

FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344  
 FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349  
 COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356  
 EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA ...6.0361  
 FLOOD PLAIN INUNDATION ...6.0364  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366  
 INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371  
 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374  
 EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA ...6.0376  
 URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377  
 TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING ...6.0378  
 URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392  
 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400  
 FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON ...6.0403  
 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
 STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415

HYDRAULICS OF SHALLOW FLOWS OVER STABLE  
ERODED SAND SURFACES DEFINED BY AREA SPEC-  
TRA ...6.0269

#### *Turbulent Flow*

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

#### *Unsteady Flow*

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE  
JAMES RIVER - VIRGINIA ...6.0396

#### FLUMES

LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085

#### GATES

NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE  
PROTECTION ...6.0097

HURRICANE PROTECTION PROJECT, STRATFORD, CON-  
NECTICUT ...6.0108

PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...6.0119

GALVESTON BAY HURRICANE SURGE - REPORT 3 - EF-  
FECTS OF BARRIERS ON TIDES, CURRENTS, SALINI-  
TIES, AND DYE DISPERSION (ABBREV) ...8.0039

DISCHARGE CHARACTERISTICS OF HURRICANE BAR-  
RIERS, WAREHAM-MARION, MASSACHUSETTS -  
HYDRAULIC MODEL INVESTIGATION ...8.0043

GALVESTON BAY HURRICANE SURGE - REPORT 1 - EF-  
FECTS OF PROPOSED BARRIERS ON HURRICANE  
SURGE HEIGHTS (ABBREV) ...8.0045

JAMAICA BAY HURRICANE BARRIER STUDY NEW  
YORK ...8.0119

#### GROINS

DESIGN FOR FLOOD CONTROL AND WAVE PROTEC-  
TION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAU-  
LIC MODEL INVESTIGATION ...6.0116

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
...15.0001

JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL  
AND HURRICANE PROTECTION ...15.0007

STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
RICANE PROTECTION PROJECT, STATEN ISLAND,  
NEW YORK ...15.0009

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
ORIENT POINT AND PORT JEFFERSON HARBOR  
...15.0028

OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, MASSACHUSETTS ...8.0035

OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, NEW BEDFORD, MAS-  
SACHUSETTS ...8.0036

WAVE AND SURGE CONDITIONS AFTER PROPOSED EX-  
PANSION OF MONTEREY HARBOR, MONTEREY,  
CALIFORNIA - HYDRAULIC MODEL INVESTIGATION  
...8.0041

WAVE AND SURGE ACTION, MONTEREY HARBOR,  
MONTEREY, CALIFORNIA - MODEL INVESTIGATION  
...8.0042

HURRICANE EFFECTS ON PORT FACILITIES ...8.0076

JAMAICA BAY HURRICANE BARRIER STUDY NEW  
YORK ...8.0119

TSUNAMI RESEARCH ...13.0005

STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER  
HILO HARBOR, HAWAII. HYDRAULIC MODEL IN-  
VESTIGATION ...13.0009

TSUNAMI RESEARCH AND ENGINEERING APPLICA-  
TIONS ...13.0015

LONG-PERIOD WAVES AND SURGES ...13.0019

THEORETICS IN DESIGN OF THE PROPOSED CRESCENT  
CITY HARBOR TSUNAMI MODEL ...13.0026

A REVIEW OF THE EXPERIMENTAL DATA RELATIVE  
TO THE PILOT MODEL STUDY FOR THE DESIGN OF  
HILO HARBOR TSUNAMI MODEL ...13.0027

#### HYDRODYNAMICS

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUD-  
ING RESERVOIR INTERACTION ...3.0029

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY  
DAMS ...3.0031

#### JETTIES

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
...15.0001

#### LEVEES

CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS  
RELATING TO CHANNEL DEVELOPMENT, EROSION,  
& BANK & LEVEE PROTECTION ...6.0053

GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE  
PROTECTION ASSOCIATED WATER FEATURE, BAYOU  
LAFOURCHE - LOUISIANA (ABBREV) ...6.0096

NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE  
PROTECTION ...6.0097

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY -  
HURRICANE PROTECTION PROJECT ...6.0098

MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN  
AND VICINITY AREA) ...6.0099

PORT ARTHUR HURRICANE FLOOD PROTECTION,  
PORT ARTHUR AND VICINITY, TEXAS ...6.0152  
MISSISSIPPI BASIN MODEL ...6.0313  
LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
...10.0011  
LAND-SURFACE SUBSIDENCE, TEXAS CITY AND  
SEABROOK AREAS, TEXAS ...10.0012  
STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
RICANE PROTECTION PROJECT, STATEN ISLAND,  
NEW YORK ...15.0009

#### LININGS

FLOOD WAVES FROM A CONTROLLED BREACHED  
DAM ...6.0124  
SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT,  
EAST TWIN AND WARM CREEK IMPROVEMENT  
...6.0172

#### Locks

MODEL STUDY OF CANNELTON LOCKS AND DAM,  
OHIO RIVER, INDIANA AND KENTUCKY ...6.0312

#### Model Studies

INITIAL RESULTS FROM THE UPPER WABASH SIMULA-  
TION MODEL ...6.0088  
DESIGN FOR FLOOD CONTROL AND WAVE PROTEC-  
TION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAU-  
LIC MODEL INVESTIGATION ...6.0116  
ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAU-  
GATUCK AND HOUSATONIC RIVERS, CONNECTICUT -  
HYDRAULIC MODEL INVESTIGATION ...6.0118  
PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...6.0119  
FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH  
ADAMS MASSACHUSETTS ...6.0120  
FLOOD WAVES FROM A CONTROLLED BREACHED  
DAM ...6.0124  
MODEL STUDY OF CANNELTON LOCKS AND DAM,  
OHIO RIVER, INDIANA AND KENTUCKY ...6.0312  
STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415  
TEXAS COAST HURRICANE SURGE MODEL STUDIES  
...8.0013  
GALVESTON BAY HURRICANE SURGE - REPORT 2. EF-  
FECTS OF PROPOSED BARRIERS ON TIDES, CUR-  
RENTS, SALINITIES, AND DYE DISPERSION (ABBREV)  
...8.0038  
GALVESTON BAY HURRICANE SURGE - REPORT 3 - EF-  
FECTS OF BARRIERS ON TIDES, CURRENTS, SALINI-  
TIES, AND DYE DISPERSION (ABBREV) ...8.0039

...8.0041  
DISCHARGE CHARACTERISTICS OF HURRICANE BAR-  
RIERS, WAREHAM-MARION, MASSACHUSETTS -  
HYDRAULIC MODEL INVESTIGATION ...8.0043  
GALVESTON BAY HURRICANE SURGE - REPORT 1 - EF-  
FECTS OF PROPOSED BARRIERS ON HURRICANE  
SURGE HEIGHTS (ABBREV) ...8.0045  
JAMAICA BAY HURRICANE BARRIER STUDY NEW  
YORK ...8.0119  
STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER  
HILO HARBOR, HAWAII. HYDRAULIC MODEL IN-  
VESTIGATION ...13.0009  
STEADY-FLOW STABILITY TESTS OF NAVIGATION  
OPENING STRUCTURES, HILO HARBOR, TSUNAMI  
BARRIER, HILO, HAWAII - HYDRAULIC MODEL IN-  
VESTIGATION ...13.0010  
THEORETICS IN DESIGN OF THE PROPOSED CRESCENT  
CITY HARBOR TSUNAMI MODEL ...13.0026  
A REVIEW OF THE EXPERIMENTAL DATA RELATIVE  
TO THE PILOT MODEL STUDY FOR THE DESIGN OF  
HILO HARBOR TSUNAMI MODEL ...13.0027

#### OUTFALLS

ANALYTICAL PHYSICAL MODEL ...8.0126

#### OUTLETS

MODEL STUDY OF CANNELTON LOCKS AND DAM,  
OHIO RIVER, INDIANA AND KENTUCKY ...6.0312

#### REKETMENTS

VERIFICATION OF EMPIRICAL METHOD OF DETERMIN-  
ING RIVERBANK STABILITY (POTAMOLOGY IN-  
VESTIGATIONS - SOILS PHASE) ...10.0030

#### RIPRAP

FLOOD PROTECTION AT CULVERT OUTLETS ...6.0050  
ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAU-  
GATUCK AND HOUSATONIC RIVERS, CONNECTICUT -  
HYDRAULIC MODEL INVESTIGATION ...6.0118  
RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A  
REVIEW OF PRACTICES AND PROCEDURES ...9.0008  
ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN  
STUDY FOR THE CITY OF GLENDORA, CALIFORNIA  
...9.0026

#### SEA WALLS

PORT ARTHUR HURRICANE FLOOD PROTECTION,  
PORT ARTHUR AND VICINITY, TEXAS ...6.0152

VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0011

### SPILLWAYS

SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

NUTWOOD WATERSHED, ILLINOIS ...6.0199

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY ...6.0322

### STILLING - SETTLING BASINS

FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS ...6.0120

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

### TIDAL ACTION

OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS ...6.0109

GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION ...8.0040

GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035

### WATER VELOCITY

ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION ...6.0118

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212

TRAVEL TIME OF GEORGIA STREAMS ...6.0241

FLOOD INVESTIGATIONS IN WYOMING ...6.0414

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V ...13.0006

WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION ...8.0042

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION ...13.0009

STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION ...13.0010

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

### WEIRS

DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION ...6.0117

FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS ...6.0120

### Hydrodynamics

*See Fluid Dynamics*

*See Hydraulics*

### Hydroelectric Power

*See Energy Conversion*

*Natural Energy Sources*

### Hydrographs

*See Techniques and Instrumentation*

*Synthetic Hydrology*

### Hydrology

RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER ...3.0100

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243

ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA ...6.0035  
 WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS ...6.0036  
 FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA ...6.0043  
 PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO ...6.0063  
 HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067  
 HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA ...6.0069  
 ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071  
 CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073  
 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076  
 BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS ...6.0084  
 HYDROLOGIC STUDIES (STORM STUDIES) ...6.0095  
 HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE ...6.0103  
 HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104  
 FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113  
 FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER VALLEY ...6.0121  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149  
 APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES ...6.0164  
 DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES ...6.0165  
 STOCHASTIC HYDROLOGY ...6.0167  
 PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168  
 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169  
 FLOOD HYDROLOGY INVESTIGATIONS ...6.0183  
 HYDROLOGY OF SMALL WATERSHEDS ...6.0190  
 LAKE HYDROLOGY ...6.0207  
 HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA ...6.0208  
 HYDROLOGY OF OUTSTANDING FLOODS ...6.0211  
 FLOOD FREQUENCY OF ALABAMA STREAMS - ALABAMA ...6.0213  
 DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220

...6.0252  
 STREAMFLOW VARIABILITY - ILLINOIS ...6.0263  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
 HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267  
 THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270  
 CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310  
 HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317  
 HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319  
 HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323  
 FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327  
 HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338  
 URBAN RUNOFF ...6.0339  
 COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345  
 APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971 ...6.0350  
 APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351  
 BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368  
 FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370  
 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS ...6.0375  
 URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377  
 URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382  
 URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389  
 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400  
 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401  
 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

VALLEY - CALIFORNIA ...10.0019  
EARLY DETECTION AND CORRECTION OF SINKHOLE  
PROBLEMS - ALABAMA ...10.0027  
WEATHER SATELLITE CAPABILITIES - PRESENT AND  
FUTURE ...16.0067

### Hydrostatic

*See Soil Science and Mechanics*  
*Pressure*

### Hysteresis

*See Engineering Mechanics*

### Ice Crystals

*See Meteorology*  
*Meteorological Condensation*

### Ice Jam

*See Glaciology*  
*Ice Studies*

### Ice Studies

*See Glaciology*

### Igneous Activity - Volcanism

*See Structural Geology*  
*Tectonics*

### Igneous Rocks

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

#### ANDESITE

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

PENINSULA, WASHINGTON ...5.0128  
SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...3.0185

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

#### CRYSTALLINE ROCKS

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

#### GRANITE

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA  
...3.0115

#### INTRUSIVE ROCKS

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

#### LAVA

SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...3.0182

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

#### MAGMA

HAMILTON 2 DEGREE ...9.0048

SEISMIC SURVEILLANCE OF AUGUSTINE REDOUBT  
AND SPURR VOLCANOES, COOK INLET, ALASKA  
...14.0005

REGIONAL VOLCANOLOGY - WESTERN UNITED  
STATES INCLUDING ALASKA AND HAWAII ...14.0014

#### RHYOLITE

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...3.0185

#### TUFF

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...14.0012

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128

SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...3.0181

SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...3.0182

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

VOLCANIC HAZARDS IN THE CASCADE RANGE -  
CALIFORNIA AND WASHINGTON ...14.0007

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013

## Ignition

*See Fire Research*

## Imaging

*See Techniques and Instrumentation*  
*Optical Instrumentation*

## Impact and Shock

*See Engineering Mechanics*  
*Forces and Loadings*

## Impact of Land Use

*See Buildings & Land Development*  
*Land Use and Development*

## In Situ Techniques

*See Techniques and Instrumentation*

## In Situ Test

*See Soil Science and Mechanics*  
*Techniques and Instrumentation*

## Indexes

*See Publications*

## Indigenous Workers

*See Occupations, Populations*

## Industrial Engineering

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
...3.0056

SENSITIVITY ANALYSES AND GRAPHICAL METHOD  
FOR PRELIMINARY SOLUTIONS ...3.0062

APPLICATION OF PROBABILITY, STATISTICS AND DECISION  
THEORY IN SOIL ENGINEERING ...3.0137

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES  
...3.0215

DISASTER INVESTIGATIONS ...6.0001

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

## Industrial Pollution

*See Air Pollution*

## Industrial Sector

*See Economics*

## Industrial Structures

*See Mechanics of Structures*

## Industrial Wastes

*See Waste Water Treatment/Disposal*  
*See Water Quality*  
*Pollution Sources*

## Information Centers

NATIONAL EARTHQUAKE INFORMATION SERVICE  
...3.0051

NATIONAL FIRE DANGER RATING ...5.0027

HYDROLOGY OF SMALL WATERSHEDS ...6.0190



## Information Services

MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY ...3.0150

TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES ...3.0186

INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190

FIRE PREVENTION - CALIFORNIA ...5.0025

THE FEDERAL RESPONSE TO TROPICAL STORM AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF ...6.0002

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) ...16.0014

PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW ...16.0050

PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION TASK COMPLETION REPORT ...16.0051

THE CHARLOTTE CONSORTIUM TASK I REPORT - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM ...16.0096

THE WICHITA FALLS CONSORTIUM PHASE I REPORT - VOLUME III - ANALYSIS OF MUNICIPAL ACTIVITIES - SECTION IV - PUBLIC SAFETY SUBSYSTEM ...16.0103

## Information Systems Research

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407

### COMMUNICATION THEORY

AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129

### CONTROL THEORY

#### Control Systems

IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN ...3.0038

#### Sensitivity Techniques

HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267

### DATA REDUCTION AND ANALYSIS

COMPUTER SIMULATION OF SEVERE STORM OBSERVATIONS WITH DOPPLER RADARS ...12.0041

## Design of Experiments

WEATHER AND CLIMATE MODIFICATION - PROBLEMS AND PROGRESS ...16.0063

### Management Science

APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA ...3.0136

APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING ...3.0137

FIRE MANAGEMENT SYSTEMS ...5.0007

AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

### Optimization Technique

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

### Programming

DEVELOPMENT OF AN OPERATIONS MODEL FOR MONTANA'S WATER RESOURCES, MIDDLE CREEK RESERVOIR OPERATION ...6.0126

USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM ...6.0131

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

### Systems Analysis

FIRE MANAGEMENT SYSTEMS ...5.0007

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

AN ANALYSIS OF OPERATING SYSTEM EFFECTIVENESS - FOCUS ON THE BEHAVIOR OF LOCAL COORDINATORS ...16.0085

### MATHEMATICAL MODELS

FIRE MANAGEMENT SYSTEMS ...5.0007

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267

THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA ...7.0016  
NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...8.0125  
ANALYTICAL PHYSICAL MODEL ...8.0126  
PROBABILISTIC MODELING OF EXTREME LOADS ...12.0035

#### *Development of Models*

RUNOFF SIMULATION ...6.0156  
THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270

#### *Modification of Models*

RUNOFF SIMULATION ...6.0156

#### *Prediction Models*

STATISTICAL-DYNAMICAL PREDICTION OF HURRICANE TRACKS ...8.0091

#### *Statistical Models*

APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA ...3.0136

#### *Stochastic Models*

THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087  
STOCHASTIC HYDROLOGY ...6.0167  
RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259

#### *Testing of Models*

AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMEE RIVER BASIN - FLORIDA ...6.0066

#### **Infrared Systems**

*See Electronic Systems  
Sensing Systems*

#### **Infrared Techniques**

*See Techniques and Instrumentation*

#### **Insurance**

*See Economics  
Income Analysis*

#### **Intergovernmental Relations**

*See Social Sciences  
Government*

#### **International**

*See Law & Water  
Legislative Levels*

#### **International Programs**

NATIONAL EARTHQUAKE INFORMATION SERVICE ...3.0051

#### **Intersections**

*See Transportation Engineering*

#### **Interstate**

*See Transportation Engineering  
Highway Classification*

#### **Interstitial Water**

*See Sedimentology  
Sediment Properties*

#### **Intertidal - Littoral Areas**

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017  
SEA-CLIFF EROSION STUDIES, MASSACHUSETTS ...15.0023  
SHORE EROSION STUDY OF ERIE COUNTY, OHIO ...15.0030

#### **Intrusive Rocks**

*See Igneous Rocks*

#### **Inversion**

*See Meteorology*

*See Economics*  
*Income Analysis*

## **Ions & Gases in Water**

*See Water Quality*  
*Water Properties*

## **Irrigation**

NEBRASKA DROUGHTS - A STUDY OF THEIR PAST  
CHRONOLOGICAL AND SPATIAL EXTENT WITH IM-  
PLICATIONS FOR THE FUTURE ...2.0016

AN OPTIMUM WATER ALLOCATION MODEL BASED ON  
AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN -  
FLORIDA ...6.0066

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER  
RESOURCES PLANNING STUDIES IN NEW YORK  
...6.0130

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

REMOTE SENSING, ALFAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTA-  
BLE BRUHLANDS OF THE SOUTHWEST ...15.0002

## **Island Arcs**

*See Structural Geology*  
*Tectonic Features*

## **Islands**

JOINT PROBABILITY METHOD OF TIDE FREQUENCY  
ANALYSIS APPLIED TO ATLANTIC CITY AND LONG  
BEACH ISLAND, NEW JERSEY ...8.0112

## **Isolation, Social & Perceptual**

*See Stress - Behavioral Aspects*

## **Jet Stream**

*See Meteorology*  
*Wind*

## **Jetties**

*See Hydrology*

*See Mechanics of Structures*

## **Joints - Fractures**

*See Structural Geology*

## **Karst Topography**

*See Geomorphology*  
*Groundwater Features*

## **Key Bed - Marker Bed**

*See Stratigraphy*

## **L Waves**

*See Geophysics*  
*Seismology*

## **Lagoons**

KENNEDY SPACE CENTER OCEAN BEACH EROSION -  
FLORIDA ...15.0005

## **Lake Deposits**

*See Sedimentology*  
*Sedimentary Deposits*

## **Lakes**

BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

BIRCH LAKE, BIRCH CREEK OKLAHOMA 6.0142

APPLICATIONS OF  
TECHNIQUES 6.0144

G

SYSTEMS ...6.0335  
THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336  
SURVEY OF LAKE FLOODING FROM ERTS-1 - LAKE  
CHAMPLAIN ...6.0393  
MICRO AND MESOSCALE GEOPHYSICAL FLUID  
DYNAMICS ...8.0120  
LAKE SHORE EROSION IN ILLINOIS ...15.0020

### **Land - Sea Breezes**

*See Meteorology*  
*Wind*

### **Land and Rock Slides**

*See Geomorphology*  
*Mass Wasting*

### **Land Forming**

*See Techniques and Instrumentation*

### **Land Use**

*See Urban Research*  
*See Water Resources Management*

### **Land Use and Development**

*See Buildings & Land Development*  
*See Economics*

### **Landslides**

*See Soil Science and Mechanics*

### **Lasers - Masers**

*See Techniques and Instrumentation*  
*Remote Sensing*

### **Lava**

*See Igneous Rocks*

TY AND DURATION - NEW JERSEY ...2.0018  
FLOOD PLAIN STUDIES--MINNESOTA ...6.0304  
FLOOD PLAIN MANAGEMENT STUDIES - LOWER MIN-  
NESOTA RIVER ...6.0305

### **LEGISLATION - ZONING**

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND IN-  
COME DISTRIBUTION EFFECTS IN RALSTON CREEK  
WATERSHEDS ...6.0018  
FACTORS PERTINENT TO WATER QUALITY IN THE AL-  
BUQUERQUE METROPOLITAN AREA ...6.0128  
STUDY OF GUIDELINES FOR LAND MANAGEMENT AND  
USE OF FLOOD-PRONE AREAS IN ALABAMA ...6.0157  
LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A  
SUMMARY OF THE WISCONSIN STUDY AND AN  
ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162  
URBAN HYDROLOGY OF POWAY VALLEY, CALIFOR-  
NIA ...6.0169  
SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182  
ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194  
IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS  
...6.0218  
REGULATION OF FLOOD HAZARD AREAS TO REDUCE  
FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226  
NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL  
REPORT, FISCAL YEAR 1971 ...6.0227  
ZONING REGULATIONS OF THE CITY OF SARASOTA,  
FLORIDA ...6.0232  
MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
DRAINAGE AREAS IN FLORIDA ...6.0233  
FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN OR-  
DINANCE, MARCH, 1972 ...6.0236  
IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237  
FLOOD INUNDATION STUDY - WISCONSIN ...6.0248  
FLOOD PLAIN MAPPING IN HAWAII ...6.0250  
SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251  
STREAMFLOW VARIABILITY - ILLINOIS ...6.0263  
AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE  
STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND  
OHIO ...6.0266  
ZONING ORDINANCE - KNOX COUNTY, INDIANA  
...6.0268  
FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
CEDAR RAPIDS, IOWA ...6.0279  
FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
LINN COUNTY, IOWA ...6.0280  
ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELK-  
HORN CITY, KENTUCKY ...6.0283  
ZONING ORDINANCE - PAINTSVILLE, KENTUCKY  
...6.0284

**FLOOD PLAIN STUDIES--MINNESOTA ...6.0304**

**FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305**

**HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319**

**MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI ...6.0320**

**DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326**

**FLOOD INVESTIGATIONS - NEW YORK ...6.0331**

**COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332**

**EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342**

**DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973 ...6.0354**

**FLOOD PLAIN INUNDATION ...6.0364**

**ZONING ORDINANCE, HUNTINGDON, TENNESSEE ...6.0369**

**URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377**

**FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA ...6.0399**

**URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400**

**FLOOD INUNDATION STUDY, WISCONSIN ...6.0409**

**THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS ...6.0413**

**COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA ...8.0002**

**EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...14.0011**

**COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES ...15.0026**

**LEGISLATIVE LEVELS**

*Federal Government*

**A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES ...6.0224**

**FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES ...6.0225**

**FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398**

*International*

**ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291**

*Local Government*

**A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION ...6.0051**

**THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101**

**ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194**

**NUTWOOD WATERSHED, ILLINOIS ...6.0199**

**A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES ...6.0224**

**REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226**

**WATER RESOURCES OF MIDDLE GEORGIA ...6.0245**

**DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288**

**FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398**

*State Government*

**ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194**

**IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS ...6.0218**

**A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES ...6.0224**

**REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226**

**DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288**

**FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398**

**WATER LAW**

**ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...2.0021**

**DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO ...6.0046**

**INITIAL WATER, SEWERAGE AND FLOOD ...6.0047**

**AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066**

**AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132**

**OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150**

**PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154**

**FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160**

**DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SUMMARY REPORT ...6.0181**

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

*See Social Sciences*

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291

**Levees**

LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE CONNECTICUT RIVER FLOOD PLAINS ...6.0293

*See Hydraulics*

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294

**Level Flight**

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

*See Aeronautics and Aerodynamics  
Aircraft Flights*

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335

**Leveling**

THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

*See Techniques and Instrumentation  
Surveying Methods*

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS OF URBAN AREAS ...6.0390

**Lightning**

WATER RESOURCES POLICY IN WISCONSIN - VOLUME IV - FLOOD PLAIN MANAGEMENT ...6.0410

*See Meteorology*

**WATER RIGHTS**

**Linear**

*Easements - Right of Way*

NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION ...15.0021

*See Engineering Mechanics  
Mechanical Vibrations*

*Equity*

**Linings**

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291

*See Hydraulics*

**Law and Legal Procedures**

**Liquefaction**

*See Social Sciences*

*See Soil Science and Mechanics*

**Layered System**

**Lithification**

*See Soil Science and Mechanics  
Soil Types*

*See Sedimentology*

**Legislation - Zoning**

**Lithology**

*See Law & Water*

*See Stratigraphy*

**Legislative Processes**

**Live Load**

*See Social Sciences  
Government*

*See Engineering Mechanics  
Forces and Loadings*

## **Local Government**

*Law & Water  
Legislative Levels*

## **Location**

*Transportation Engineering  
Design*

## **Locks**

*Hydraulics*

## **Loess**

*Sedimentology  
Sedimentary Deposits*

## **Long Range Forecasting**

*Futures Research*

## **Low Cost Housing**

*Buildings & Land Development  
Building Classification*

## **Low Flow**

*Hydraulics  
Flow Types - Natural Water*

## **Lumbering**

*Forestry*

## **Lysimeters**

*Techniques and Instrumentation*

## **Macrometeorology**

*Meteorology*

## **Magnetic Studies**

*See Oceanography  
Geophysical Oceanography*

## **Magnetic Surveys**

*See Geophysics  
Magnetic Properties*

## **Magnetometers**

*See Geophysics  
Geophysical Instrumentation*

## **Maintenance**

*See Buildings & Land Development  
See Transportation Engineering*

## **Management**

*See Economics  
Production and Processing  
See Water Resources Management*

## **Management and Administration**

*See Social Sciences*

## **Management and Planning**

*See Solid Waste Management*

## **Management Science**

*See Information Systems Research  
Economic Theory*

## **Manpower**

*See Social Sciences*

*Manufacturing*  
*Buildings & Land Development*  
*Building Classification*

## Maps and Surveys

*See Techniques and Instrumentation*

## Marinas

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION  
...15.0001

ENVIRONMENTAL GEOMORPHIC STUDY OF THE  
COASTAL REGIMES ALONG THE SOUTH SHORE OF  
LONG ISLAND - NEW YORK ...15.0027

## Marine Biology

BENEFITS OF ENVIRONMENTAL PREDICTION IN THE  
EASTERN GULF OF MEXICO ...8.0106  
OPERATION AGNES ...8.0135

EACH EROSION PROJECT, DELAWARE COAST PRO-  
TECTION PROJECT, DELAWARE ...15.0010

## MARINE ANIMALS

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

SAN FRANCISCO BAY ...15.0013

## MARINE PLANTS

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

SAN FRANCISCO BAY ...15.0013

## Marine Geology

*See Oceanography*

## Marine Navigation Systems

*See Electronic Systems*

*See Mechanics of Structures*  
*Concrete Structures*  
*See Techniques and Instrumentation*  
*Measurements & Measuring*

## Mass Wasting

*See Geomorphology*

## Mathematical Analysis

*See Techniques and Instrumentation*

## Mathematical Models

*See Information Systems Research*  
*See Techniques and Instrumentation*  
*Model Studies*

## Measurements & Measuring

*See Techniques and Instrumentation*

## Measuring Devices

*See Techniques and Instrumentation*  
*Measurements & Measuring*

## Mechanical Power & Equipment

### CONTROL DEVICES

*Energy Dissipators*

ENERGY ABSORPTION CHARACTERISTICS OF STRUC-  
TURAL SYSTEMS SUBJECTED TO EARTHQUAKE EX-  
CITATION ...3.0032

A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN  
EARTHQUAKE ENGINEERING ...3.0252

LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085

### Valves

SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING  
SYSTEMS AND COMPONENTS ...3.0265



STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS ...3.0068

GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

#### NUCLEAR POWER

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0017

SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168

SEISMIC RESEARCH ...3.0225

NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

#### POWER PLANTS

SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168

SEISMIC RESEARCH ...3.0225

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

#### PUMPS

SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265

PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS ...6.0152

### Mechanical Properties

*See Soil Science and Mechanics*

#### Mechanical Shock

*See Engineering Mechanics  
Stresses*

#### Mechanical Vibrations

*See Engineering Mechanics*

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER STRUCTURES SURROUNDED BY WATER ...3.0034

EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES ...3.0037

NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042

CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFORMATION OF ENGINEERING MATERIALS ...3.0081

PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA ...3.0121

PROBABILITY OF FATIGUE FAILURE UNDER EARTHQUAKE LOADS ...3.0251

A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING ...3.0252

#### BARs

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS ...3.0205

#### BEAMS

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION ...3.0032

DYNAMIC ANALYSIS OF COUPLED SHEAR WALLS AND SANDWICH BEAMS ...3.0045

STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS ...3.0073

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES ...3.0082

RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS ...3.0084

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

CYCLIC LOADING OF FULL-SIZE CONNECTIONS ...3.0089

DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS ...3.0271

THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE ...3.0274

#### CANTILEVERS

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

#### COLUMNS

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES ...3.0027

ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION ...3.0032

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076

GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES ...3.0082

CYCLIC LOADING OF FULL-SIZE CONNECTIONS ...3.0089

OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS ...3.0090

ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES ...3.0098

STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS ...3.0099

EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN ...3.0206

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212

SHEAR STRENGTH DECAY IN REINFORCED CONCRETE COLUMNS SUBJECTED TO LARGE DEFLECTION REVERSALS ...3.0214

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS ...3.0282

#### CONCRETE STRUCTURES

SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254

INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE ...3.0273

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION ...15.0001

VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0011

#### Mass

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS ...3.0031

STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047) ...3.0065

#### Reinforced

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0014

DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE ...3.0026

ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION ...3.0032

SENSITIVITY ANALYSES AND GRAPHICAL METHOD FOR PRELIMINARY SOLUTIONS ...3.0062

DAMAGE PROBABILITY MATRICES FOR PROTOTYPE BUILDINGS ...3.0063

STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS ...3.0073

EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR ...3.0076

NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS ...3.0078

RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS ...3.0084

CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR ...3.0088

ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES ...3.0098

ELASTOMERIC ENERGY ABSORBER ...3.0152

DESIGN CRITERIA FOR MASONRY ...3.0194

...3.0206  
 SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207  
 RESPONSE AND ENERGY-DISSIPATION OF REINFORCED  
 CONCRETE FRAMES SUBJECTED TO STRONG BASE  
 MOTIONS ...3.0210  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
 BUILDINGS ...3.0211  
 EVALUATION OF STRUCTURAL DAMAGE CAUSED BY  
 EARTHQUAKE TOWARD THE DEVELOPMENT OF  
 EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212  
 SHEAR STRENGTH DECAY IN REINFORCED CONCRETE  
 COLUMNS SUBJECTED TO LARGE DEFLECTION  
 REVERSALS ...3.0214

### FRAMES

LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUC-  
 TURES ...3.0027  
 ENERGY ABSORPTION CHARACTERISTICS OF STRUC-  
 TURAL SYSTEMS SUBJECTED TO EARTHQUAKE EX-  
 CITATION ...3.0032  
 QUASI-STATIC LATERAL DESIGN LOADS FOR  
 EARTHQUAKE RESISTANT STRUCTURES ...3.0058  
 NONLINEAR ANALYSIS OF REINFORCED CONCRETE  
 FRAMES AND PANELS ...3.0078  
 CYCLIC LOADING OF FULL-SIZE CONNECTIONS  
 ...3.0089  
 OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT  
 SHEAR BUILDINGS ...3.0090  
 STATIC AND EARTHQUAKE ANALYSIS OF THREE-  
 DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS  
 ...3.0099  
 SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207  
 RESPONSE AND ENERGY-DISSIPATION OF REINFORCED  
 CONCRETE FRAMES SUBJECTED TO STRONG BASE  
 MOTIONS ...3.0210  
 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
 BUILDINGS ...3.0211  
 EVALUATION OF STRUCTURAL DAMAGE CAUSED BY  
 EARTHQUAKE TOWARD THE DEVELOPMENT OF  
 EARTHQUAKE-RESISTANT DESIGN (ABBREV) ...3.0212  
 ADAPTIVE STRUCTURAL SYSTEMS ...3.0253

### GEOMETRIC CONFIGURATION

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDA-  
 TION SYSTEMS ...3.0036

#### *Circular*

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION  
 SYSTEMS ...3.0041

#### *Cylindrical*

STABILITY AND DYNAMIC RESPONSE OF COOLING  
 TOWERS ...3.0068

THE SAN FERNANDO EARTHQUAKE SOILS AND  
 GEOLOGIC INVESTIGATIONS IN RELATION TO  
 HIGHWAY DAMAGE ...3.0012

A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL  
 LIQUEFACTION POTENTIAL ...3.0097

PROTECTION OF TRANSPORTATION FACILITIES  
 AGAINST EARTHQUAKES ...3.0199

### HYDRAULIC STRUCTURES

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUD-  
 ING RESERVOIR INTERACTION ...3.0029

COMPARISON OF COMPUTED AND MEASURED  
 DYNAMIC RESPONSE OF MONTICELLO DAM ...3.0053

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
 DAMS ...3.0066

ADAP - A COMPUTER PROGRAM FOR STATIC AND  
 DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

EARTHQUAKES AND ACTIVE FAULTS ...3.0173

### INDUSTRIAL STRUCTURES

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR  
 ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

### JOINTS

CYCLIC LOADING OF FULL-SIZE CONNECTIONS  
 ...3.0089

ANALYTICAL INVESTIGATIONS OF THE SEISMIC  
 RESPONSE OF LONG MULTIPLE SPAN HIGHWAY  
 BRIDGES ...3.0098

### MODEL STUDIES

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDA-  
 TION SYSTEMS ...3.0036

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION  
 SYSTEMS ...3.0041

QUASI-STATIC LATERAL DESIGN LOADS FOR  
 EARTHQUAKE RESISTANT STRUCTURES ...3.0058

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN  
 SUBASSEMBLAGES ...3.0082

ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-  
 BUILDING SYSTEMS ...3.0085

THREE DIMENSIONAL STOCHASTIC MODELLING OF  
 STRONG EARTHQUAKE GROUND MOTIONS ...3.0087

EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MO-  
 TION ON A REINFORCED CONCRETE COLUMN  
 ...3.0206

INELASTIC DESIGN OF BUILDING FRAMES TO RESIST  
 EARTHQUAKES ...3.0227

DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL

TOWERS ...3.0079  
STATIC AND EARTHQUAKE ANALYSIS OF THREE-  
DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS  
...3.0099

#### PLATES

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION  
SYSTEMS ...3.0041

#### PREFABRICATED STRUCTURES

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST  
HOUSING AND COMMUNITY BUILDINGS TO BETTER  
WITHSTAND EARTHQUAKES AND WINDSTORMS  
...8.0077

#### SHELLS

STABILITY AND DYNAMIC RESPONSE OF COOLING  
TOWERS ...3.0068

#### SLABS

SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN  
AND WALL CONNECTIONS ...3.0282

#### STEEL STRUCTURES

DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN  
THE VICINITY OF THE SAN FERNANDO  
EARTHQUAKE ...3.0026

THE FORMULATION AND EXPERIMENTAL VERIFICA-  
TION OF MATHEMATICAL MODELS FOR PREDICTING  
DYNAMIC RESPONSE OF MULTISTORY BUILDINGS  
...3.0061

DAMAGE PROBABILITY MATRICES FOR PROTOTYPE  
BUILDINGS ...3.0063

INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN  
SUBASSEMBLAGES ...3.0082

CYCLIC LOADING OF FULL-SIZE CONNECTIONS  
...3.0089

DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY  
BRACED STEEL BUILDING ...3.0091

FORCED VIBRATION OF A 22-STORY STEEL FRAME  
BUILDING ...3.0144

ANALYSIS OF THE EARTHQUAKE RESPONSE OF A  
NINE-STORY STEEL FRAME BUILDING DURING THE  
SAN FERNANDO EARTHQUAKE ...3.0148

SEISMIC DESIGN OF BUILDING STRUCTURES ...3.0254

STOCHASTIC INELASTIC RESPONSE OF OFFSHORE  
TOWERS TO STRONG MOTION EARTHQUAKES  
...3.0033

DYNAMIC ANALYSIS OF COUPLED SHEAR WALLS AND  
SANDWICH BEAMS ...3.0045

COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTI-  
CAL STRUCTURES BASED ON SEISMOGRAMS FROM  
THE SAN FERNANDO EARTHQUAKE (ABBREVI)  
...3.0048

STABILITY AND DYNAMIC RESPONSE OF COOLING  
TOWERS ...3.0068

ADAP - A COMPUTER PROGRAM FOR STATIC AND  
DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077

ANALYSIS OF THE SLIDES IN THE SAN FERNANDO  
DAMS DURING THE EARTHQUAKE OF FEBRUARY 9,  
1971 ...3.0095

STATIC AND EARTHQUAKE ANALYSIS OF THREE-  
DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS  
...3.0099

TECHNIQUES FOR RETROFITTING EXISTING BRIDGE  
STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO  
EARTHQUAKE DAMAGE ...3.0204

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

EARTHQUAKE EFFECTS ON REINFORCED CONCRETE  
BUILDINGS ...3.0211

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUC-  
TURES ...8.0102

#### STRUCTURAL DESIGN

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY  
BRIDGES ...3.0003

QUASI-STATIC LATERAL DESIGN LOADS FOR  
EARTHQUAKE RESISTANT STRUCTURES ...3.0058

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
DAMS ...3.0066

THREE-YEAR OPERATION OF THE UNIVERSITIES  
COUNCIL FOR EARTHQUAKE ENGINEERING  
RESEARCH ...3.0143

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUC-  
TURES ...3.0215

SHEAR MODULUS AND DAMPING IN SOILS - DESIGN  
EQUATIONS AND CURVES ...3.0216

FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS ...6.0145

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
& FLOOD INUNDATION - NEW JERSEY ...6.0326

INVESTIGATION OF RED RIVER VALLEY GEOLOGY -  
EFFECTS ON STRUCTURE DESIGN AND PER-  
FORMANCE ...9.0018

## SUPPORT STRUCTURES

- A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097
- SEISMIC DESIGN FOR BUILDINGS ...3.0187
- SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS ...3.0265
- A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023
- ROCK STRENGTH FROM FAILURE CASES ...9.0054

## TRUSSES

- GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES ...3.0079

## WOOD STRUCTURES

- STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A ...3.0002
- FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD ...3.0195

## Medical Services

- FIRE PREVENTION - CALIFORNIA ...5.0025
- TRAINING AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA ...6.0010
- COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES ...16.0013
- CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) ...16.0014
- ANALYSIS OF EMERGENCY MEDICAL SERVICES COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL SUBDIVISIONS ...16.0016
- SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY ...16.0018
- TRAINING PROGRAM FOR CRISIS INTERVENORS ...16.0020
- EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES ...16.0022
- PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION TASK COMPLETION REPORT ...16.0051
- THE DEVELOPMENT OF A MEANS FOR ASSESSING EMERGENCY MEDICAL RESOURCES ...16.0052

## Mesometeorology

*See Meteorology*

## Metallic Ores

*See Economic Geology*

## Metamorphic Rocks

- SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO ...3.0181
- HAMILTON 2 DEGREE ...9.0048

## Meteoric Water

*See Water Types*

## Meteorology

- FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301

## ADVECTION

- FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040
- CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088

## AIR MASS

- FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040
- THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043
- ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS OF EXTRATROPICAL CYCLONES ...8.0137

## AIR PATTERNS AND CIRCULATION

- FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033
- FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040
- TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES ...8.0053
- TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO ...8.0106  
 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS ...8.0111  
 STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032  
 DUST DEVIL METEOROLOGY ...12.0036

#### AIR PRESSURE - DENSITY

STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN ...7.0018  
 MEMORABLE HURRICANES OF THE UNITED STATES SINCE 1973 ...8.0016  
 A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS ...8.0059  
 THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION ...8.0069  
 STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072  
 ATLANTIC TROPICAL SYSTEMS OF 1972 ...8.0084  
 CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088  
 PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL ...8.0089  
 ERROR ANALYSIS OF HURRICANE FORECASTS ...8.0092  
 BAROTROPIC PREDICTION OF HURRICANE TRACKS ...8.0093  
 THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES ...8.0099  
 FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES ...8.0116  
 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123  
 NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS ...12.0019  
 SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023  
 ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON ...12.0030  
 PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN ...15.0025

#### AIR TEMPERATURE

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011  
 SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI ...2.0015

LIGHTNING FIRES ...5.0019  
 NATIONAL FIRE DANGER RATING ...5.0027  
 FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033  
 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
 THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043  
 CLIMATES OF THE STATES - CLIMATE OF NEW YORK ...6.0289  
 STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN ...7.0018  
 THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION ...8.0069  
 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST) ...8.0087  
 BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO ...8.0106  
 TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V ...13.0006

#### AIR TURBULENCE

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054  
 NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH ...8.0117

#### ATMOSPHERE DISTURBANCE

##### *Cyclones - Anticyclones*

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023  
 STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA ...12.0034

##### *Fronts*

CASE STUDIES OF COASTAL CONVECTIVE STORMS AS OBSERVED BY DOPPLER RADAR ...8.0121  
 STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA ...12.0034  
 PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035

##### *Hurricanes - Tropical Cyclones*

NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I ...5.0023  
 THE FEDERAL RESPONSE TO TROPICAL STORM AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF ...6.0002  
 FLOOD INSURANCE STUDY ...6.0006

- PENNSYLVANIA, HUD PROJECT NO. R-615C ...8.0029
- NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION ...6.0097
- LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT ...6.0098
- MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA) ...6.0099
- OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS ...6.0110
- PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS ...6.0152
- HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234
- ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...6.0359
- EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA ...6.0361
- EFFECTS OF TROPICAL STORM AGNES ON THE CHESAPEAKE BAY ...8.0003
- ATLANTIC HURRICANE SEASON OF 1972 ...8.0005
- APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION ...8.0006
- THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE ...8.0007
- EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELEUR ISLAND CHAIN AND THE EASTERN PORTION OF THE LOWER MISSISSIPPI DELTA ...8.0008
- ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES ...8.0009
- REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI ...8.0010
- GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV) ...8.0011
- GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV) ...8.0012
- TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013
- SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969 ...8.0014
- HURRICANE CELIA REDEVELOPMENT ...8.0015
- NATIONAL HURRICANE OPERATION PLAN ...8.0020
- EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA ...8.0026
- ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027
- HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT ...8.0034
- OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS ...8.0035
- GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038
- GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039
- GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION ...8.0040
- DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION ...8.0043
- DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION ...8.0044
- GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046
- PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...8.0047
- THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST ...8.0049
- PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO ...8.0051
- TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES ...8.0053
- TROPICAL CYCLONE ENERGY TRANSFER ...8.0054
- THE EFFECTS OF HURRICANE CAMILLE ON INDUSTRY, PUBLIC UTILITIES, AND PUBLIC WORKS OPERATIONS ...8.0056
- HURRICANE MODIFICATION ...8.0057
- TROPICAL METEOROLOGIC PROBLEMS ...8.0058
- HURRICANE RESEARCH MODELING ...8.0061
- HURRICANE MODELING ...8.0062
- HURRICANE-TYPHOON DYNAMICS ...8.0063
- HURRICANE-OCEAN INTERACTION ...8.0064
- INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES ...8.0066
- STUDIES OF CUMULUS HEATING AND THE CISK MECHANISM ...8.0067

CANE/TYPHOON PACKAGES AND ASSOCIATED DATA ...8.0071  
 STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072  
 HURRICANE CAMILLE - AUGUST 1969 ...8.0074  
 TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES ...8.0075  
 HURRICANE EFFECTS ON PORT FACILITIES ...8.0076  
 DAMAGE AND SURGE DAMAGE DUE TO HURRICANE CAMILLE ...8.0078  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT ...8.0081  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT ...8.0082  
 HURRICANE PREPAREDNESS AND CONTROL PLAN ...8.0083  
 ATLANTIC TROPICAL SYSTEMS OF 1972 ...8.0084  
 HURRICANE DEBBIE MODIFICATION EXPERIMENTS, AUGUST 1969 ...8.0085  
 COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY ...8.0086  
 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST) ...8.0087  
 CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088  
 PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL ...8.0089  
 GRAPHICAL DISPLAY OF HURRICANE FORECASTS ...8.0090  
 STATISTICAL-DYNAMICAL PREDICTION OF HURRICANE TRACKS ...8.0091  
 COMPARISON OF HURRICANE FORECASTS ...8.0092  
 TROPICAL PREDICTION OF HURRICANE TRACKS ...8.0093  
 LANDFALL ERRORS IN HURRICANE FORECASTS ...8.0094  
 HURRICANE STORMFURY ANNUAL REPORT 1971 ...8.0095  
 HURRICANE MODIFICATION BY CLOUD SEEDING ...8.0096  
 ANALYSIS OF SATELLITE DATA IN STUDIES OF TROPICAL STURBANCES ...8.0098  
 THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL STURBANCES ...8.0099  
 PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY ...8.0100  
 PROBABILISTIC MODELING OF EXTREME LOADS ...8.0101  
 CLIMATE CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE ...8.0103  
 SHORTWAVE METEOROLOGY ...8.0104

TROPICAL STORM SURGE FORECASTING ...8.0109  
 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS ...8.0110  
 SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS ...8.0114  
 NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH ...8.0117  
 JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119  
 MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS ...8.0120  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER) ...8.0122  
 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123  
 NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...8.0125  
 SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE LISTING OF TROPICAL CYCLONES THAT HAVE AFFECTED SOUTH CAROLINA ...8.0127  
 OBJECTIVE ANALYSIS OF THE SEA SURFACE TEMPERATURE ...8.0129  
 A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES ...8.0130  
 THE DECISION PROCESS IN HURRICANE FORECASTING ...8.0131  
 ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE ...8.0132  
 OPERATION AGNES ...8.0135  
 ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS OF EXTRATROPICAL CYCLONES ...8.0137  
 DISASTER INVESTIGATIONS ...12.0001  
 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1974 ...12.0005  
 HURRICANE SPAWNED TORNADOES ...12.0028  
 LONG-PERIOD WAVES AND SURGES ...13.0019  
 BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA ...15.0006  
 STATEN ISLAND BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, STATEN ISLAND, NEW YORK ...15.0009  
 VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0011  
 PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035  
 THE SALVATION ARMY - ITS STRUCTURE, OPERATIONS, AND PROBLEMS IN DISASTERS ...16.0017



A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
SATELLITE ...16.0047

ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
NADOES AND HURRICANES ...16.0057

WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
AND PROGRESS ...16.0063

A FEDERAL PLAN FOR NATURAL DISASTER WARNING  
AND PREPAREDNESS ...16.0071

WEATHER MODIFICATION - FISCAL YEARS 1969, 1970,  
1971 ...16.0090

DISASTER RELIEF - DOMESTIC ACTION IN THE SPOT-  
LIGHT ...16.0101

#### *Monsoons*

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098

#### *Severe Storms*

STUDIES OF URBAN EFFECTS ON RAINFALL AND  
SEVERE WEATHER ...2.0004

APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA - REGION EIGHT - 1971  
...6.0350

STORM CHARACTERISTICS AND RAINFALL INTENSITY  
IN WEST VIRGINIA ...6.0406

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF  
SUPPRESSING HAIL ...7.0007

THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011

STUDIES OF CUMULUS HEATING AND THE CISK  
MECHANISM ...8.0067

VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF  
THE GOES SATELLITE ...8.0108

NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH  
...8.0117

NUMERICAL STUDIES IN THE CIRCULATIONS AND  
STORM SURGES IN LAKE ONTARIO ...8.0138

THE OCHELTREE TORNADO - A CASE STUDY - MISSOU-  
RI ...12.0003

FEDERAL PLAN FOR METEOROLOGICAL SERVICES &  
SUPPORTING RESEARCH - FISCAL YEAR 1974  
...12.0005

MORPHOLOGY OF TWO TORNADIC STORMS - AN  
ANALYSIS OF NSSL DATA ON APRIL 30, 1970 -  
OKLAHOMA CITY, OKLAHOMA ...12.0007

ARIZONA 'EDDY' TORNADOES ...12.0010

NATIONAL SEVERE LOCAL STORMS OPERATIONS  
PLAN ...12.0012

NATIONAL EAST COAST WINTER STORMS - OPERA-  
TIONS PLAN ...12.0013

DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS  
...12.0017

TORNADOES ...12.0021

OBSERVATIONS OF SEVERE STORMS ON 26 AND 28  
APRIL 1971 ...12.0022

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

DOPPLER RADAR METHODOLOGY FOR THE OBSERVA-  
TION OF CONVECTIVE STORMS ...12.0026

HURRICANE SPAWNED TORNADOES ...12.0028

ESTIMATE OF MAXIMUM WIND SPEEDS OF TOR-  
NADOES IN THREE NORTHWESTERN STATES -  
IDAHO, OREGON, WASHINGTON ...12.0030

STUDY OF URBAN EFFECTS ON PRECIPITATION AND  
SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032

HYDROMETEOROLOGICAL ANALYSIS OF SEVERE  
RAINSTORMS - ILLINOIS ...12.0033

STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH  
AMERICA ...12.0034

DAILY TORNADO FREQUENCIES FOR THE CON-  
TIGUOUS UNITED STATES ...12.0037

SOME STATISTICAL ASPECTS OF WATERSPOUT FOR-  
MATION - FLORIDA ...12.0039

IMPACT OF THE LUBBOCK STORM ON REGIONAL  
SYSTEMS - TEXAS ...12.0040

COMPUTER SIMULATION OF SEVERE STORM OBSER-  
VATIONS WITH DOPPLER RADARS ...12.0041

SHORT-TERM CLIMATE CHANGES AND COASTAL ERO-  
SION, BARROW, ALASKA ...15.0014

FEDERAL PLAN FOR WEATHER RADARS ...16.0046

WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
AND PROGRESS ...16.0063

#### *Storms and Squalls*

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...2.0019

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST  
HOUSING AND COMMUNITY BUILDINGS TO BETTER  
WITHSTAND EARTHQUAKES AND WINDSTORMS  
...3.0191

EFFECT OF PRESCRIBED BURNING ON WATER YIELD  
AND QUALITY FROM BRUSH INFESTED LANDS -  
TEXAS ...5.0022

MONITORING FLOOD DAMAGE WITH SATELLITE  
IMAGERY ...6.0030

DEVELOPMENT OF A FLOOD AND POLLUTION CON-  
TROL PLAN FOR THE CHICAGOLAND AREA - COM-  
PUTER SIMULATION PROGRAMS ...6.0083

OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, MASSACHUSETTS ...6.0109

MAGNITUDE AND FREQUENCY OF FLOOD  
DISCHARGES FROM SMALL DRAINAGE BASINS, EF-  
FECTS OF DRAINAGE BASIN CHARACTERISTICS -  
NORTH DAKOTA ...6.0138

CLOUD SEEDING POTENTIAL FOR TWELVE RIVER  
BASINS ...6.0171

DOUBLE MAXIMUM PRECIPITATION AND SNOW-  
MELT CRITERIA FOR RED RIVER OF THE NORTH  
ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT,  
NORTH DAKOTA ...6.0290

TERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
FLOOD INUNDATION - NEW JERSEY ...6.0326

EFFECTS OF URBANIZATION ON FLOODS IN THE DAL-  
LAS, TEXAS METROPOLITAN AREA ...6.0374

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS  
WATERSHEDS ...6.0375

VARIATION OF URBAN RUNOFF WITH DURATION AND  
INTENSITY OF STORMS - TEXAS ...6.0387

RELATIONSHIP OF CLIMATIC AND WATERSHED CHARAC-  
TERISTICS TO STORM RUNOFF IN THE EDWARDS  
PLATEAU - TEXAS ...6.0388

STORM CHARACTERISTICS AND RAINFALL INTENSITY  
IN WEST VIRGINIA ...6.0406

COASTAL STORM DAMAGE WITH SPECIAL REFERENCE  
TO THE DELMARVA REGION OF DELAWARE, MARY-  
LAND, VIRGINIA ...8.0002

GRAPHICAL DISPLAY OF HURRICANE FORECASTS  
...8.0090

ROTROPIC PREDICTION OF HURRICANE TRACKS  
...8.0093

QUAL, IR, AND DATA COLLECTION CAPABILITIES OF  
THE GOES SATELLITE ...8.0108

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES  
FROM HURRICANES - PART 2. GENERAL TRACK AND  
VARIANT STORM CONDITIONS ...8.0111

STORM CONDITIONS AND AUTOMATED FORECASTS  
FOR THE ATLANTIC COASTAL STORM OF FEBRUARY  
3-20, 1972 ...8.0115

STUDIES OF COASTAL CONVECTIVE STORMS AS  
OBSERVED BY DOPPLER RADAR ...8.0121

INVESTIGATION OF SHORELINE CHANGES AT SAR-  
GENT BEACH, TEXAS ...8.0128

RECASTING STORM-INDUCED BEACH CHANGES  
ALONG VIRGINIA'S OCEAN COAST ...8.0134

THE MODIFICATION OF GREAT LAKES WINTER  
STORMS ...11.0003

LOW FORECASTING FOR SOUTHEASTERN WISCONSIN  
...11.0005

FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZ-  
LE IN OHIO ...11.0009

TORNADOES ...12.0021

DOPPLER RADAR METHODOLOGY FOR THE OBSERVA-  
TION OF CONVECTIVE STORMS ...12.0026

HURRICANE SPAWNED TORNADOES ...12.0028

RECASTING GUSTY SURFACE WINDS IN THE CON-  
TINENTAL UNITED STATES ...12.0029

SYNOPTOMETEOROLOGICAL ANALYSIS OF SEVERE  
WINDSTORMS - ILLINOIS ...12.0033

NATIONAL SHORELINE STUDY - GREAT LAKES REGION  
INVENTORY REPORT ...15.0019

SIMULATION MODEL FOR STORM CYCLES AND BEACH  
EROSION ON LAKE MICHIGAN ...15.0024

PROFILE OF A STORM - WIND, WAVES AND EROSION  
ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN  
...15.0025

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
SATELLITE ...16.0047

#### *Thunderstorms*

METHODS FOR THE PREVENTION AND CONTROL OF  
LIGHTNING FIRES ...5.0019

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN  
NEVADA ...7.0016

THE OCHEL TREE TORNADO - A CASE STUDY - MISSOU-  
RI ...12.0003

MORPHOLOGY OF TWO TORNADIC STORMS - AN  
ANALYSIS OF NSSI DATA ON APRIL 30, 1970 -  
OKLAHOMA CITY, OKLAHOMA ...12.0007

SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUN-  
DERSTORM AND TORNADO WATCHES WITHIN THE  
NATIONAL WEATHER SERVICE, EASTERN REGION  
...12.0020

OBSERVATIONS OF SEVERE STORMS ON 26 AND 28  
APRIL 1971 ...12.0022

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-  
30, 1970 ...12.0024

STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH  
AMERICA ...12.0034

CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS  
ON PRECIPITATION - PART 1 ...16.0082

#### *Tornadoes - Waterspouts*

PROBABILISTIC MODELING OF EXTREME LOADS  
...13.0213

FEDERAL PLAN FOR METEOROLOGICAL SERVICES &  
SUPPORTING RESEARCH - FISCAL YEAR 1974 ...8.0004

HURRICANE SPAWNED TORNADOES ...8.0068

PRELIMINARY CLIMATIC DATA REPORT HURRICANE  
AGNES JUNE 14-23, 1972 ...8.0123

DISASTER INVESTIGATIONS ...12.0001

TORNADO - THE VOICE OF THE PEOPLE IN DISASTER  
AND AFTER - A STUDY IN RESIDENTIAL INTEGRA-  
TION - TEXAS-(LUBBOCK?) ...12.0002

THE OCHEL TREE TORNADO - A CASE STUDY - MISSOU-  
RI ...12.0003

TORNADOES IN TENNESSEE (1916-1970) WITH  
REFERENCE TO NOTABLE TORNADO DISASTER IN  
THE UNITED STATES (1880-1970) ...12.0009

ARIZONA 'EDDY' TORNADOES ...12.0010

MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971  
- A REPORT TO THE ADMINISTRATOR ...12.0015

NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON  
BUILDINGS - TEXAS ...12.0019

SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUN-  
DERSTORM AND TORNADO WATCHES WITHIN THE  
NATIONAL WEATHER SERVICE, EASTERN REGION  
...12.0020

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS  
...12.0025

EM RADIATION-TORNADOES ...12.0027

PROPOSED CHARACTERIZATION OF TORNADOES AND  
HURRICANES BY AREA AND INTENSITY ...12.0031

DAILY TORNADO FREQUENCIES FOR THE CON-  
TIGUOUS UNITED STATES ...12.0037

MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR  
ATTACK, NATURAL AND OTHER DISASTERS ...16.0044

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
SATELLITE ...16.0047

ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
NADOES AND HURRICANES ...16.0057

A FEDERAL PLAN FOR NATURAL DISASTER WARNING  
AND PREPAREDNESS ...16.0071

WEATHER MODIFICATION - FISCAL YEARS 1969, 1970,  
1971 ...16.0090

#### ATMOSPHERIC ENERGY

STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
WISCONSIN ...7.0018

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL  
DISTURBANCES ...8.0099

NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN  
TROPICAL CYCLONES ...8.0125

OBJECTIVE ANALYSIS OF THE SEA SURFACE TEM-  
PERATURE ...8.0129

ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS  
OF EXTRATROPICAL CYCLONES ...8.0137

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

EM RADIATION-TORNADOES ...12.0027

DUST DEVIL METEOROLOGY ...12.0036

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

HURRICANE-OCEAN INTERACTION ...8.0064

STUDIES OF CUMULUS HEATING AND THE CISK  
MECHANISM ...8.0067

OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERA-  
TURES (SST) ...8.0087

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL  
DISTURBANCES ...8.0099

MICRO AND MESOSCALE GEOPHYSICAL FLUID  
DYNAMICS ...8.0120

DUST DEVIL METEOROLOGY ...12.0036

#### CLIMATOLOGY

FLOOD INVESTIGATIONS - HIGHWAY COMMISSION -  
KANSAS ...6.0091

RUNOFF SIMULATION ...6.0156

RELATION OF CLIMATIC AND WATERSHED CHARAC-  
TERISTICS TO STORM RUNOFF IN THE EDWARDS  
PLATEAU - TEXAS ...6.0388

#### *Applied Climatology*

DROUGHT IN KANSAS ...2.0013

DROUGHT AND WET SPELLS IN NORTH DAKOTA  
...2.0020

DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR  
PUERTO RICO ...2.0022

METEOROLOGICAL DROUGHT IN TENNESSEE ...2.0024

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327

STORM CHARACTERISTICS AND RAINFALL INTENSITY  
IN WEST VIRGINIA ...6.0406

WEATHER & CLIMATE MODIFICATION PROBLEMS AND  
PROGRESS ...16.0066

#### *Climatography*

DROUGHT CLIMATOLOGY OF ILLINOIS ...2.0011

DROUGHT IN KANSAS ...2.0013

SEVERITY AND FREQUENCY OF DROUGHT IN MISSIS-  
SIPPI ...2.0015

THE DETERMINATION OF THE FREQUENCY OF  
DROUGHT FLOWS OF VARYING DEGREES OF SEVERI-  
TY AND DURATION - NEW JERSEY ...2.0018

DROUTH PROBABILITIES IN TENNESSEE ...2.0023

METEOROLOGICAL DROUGHT IN TENNESSEE ...2.0024

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

...8.0086  
 PRELIMINARY CLIMATIC DATA REPORT HURRICANE  
 AGNES JUNE 14-23, 1972 ...8.0123  
 ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S.  
 COASTLINE ...8.0132  
 A SYNOPTIC CLIMATOLOGY FOR SNOWSTORMS IN  
 NORTHWESTERN NEVADA ...11.0006  
 DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS  
 ...12.0017  
 STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH  
 AMERICA ...12.0034  
 SOME STATISTICAL ASPECTS OF WATERSPOUT FOR-  
 MATION - FLORIDA ...12.0039  
 WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
 AND PROGRESS ...16.0063  
 NATIONAL ATMOSPHERIC SCIENCES PROGRAM -  
 FISCAL YEAR 1974 ...16.0076  
 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS  
 ON PRECIPITATION - PART I ...16.0082  
 OPERATIONS OF THE NATIONAL WEATHER SERVICE  
 ...16.0092

#### *Physical Climatology*

OPSET - PROGRAM FOR COMPUTERIZED SELECTION  
 OF WATERSHED PARAMETER VALUES FOR THE  
 STANFORD WATERSHED MODEL ...6.0285  
 APPRAISAL OF THE WATER AND RELATED LAND  
 RESOURCES OF OKLAHOMA - REGION EIGHT - 1971  
 ...6.0350  
 APPRAISAL OF THE WATER AND RELATED LAND  
 RESOURCES OF OKLAHOMA ...6.0351  
 URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS  
 01' ...6.0377  
 HURRICANE SPAWNED TORNADOES ...8.0068  
 PRELIMINARY CLIMATIC DATA REPORT HURRICANE  
 AGNES JUNE 14-23, 1972 ...8.0123  
 SHORT-TERM CLIMATE CHANGES AND COASTAL ERO-  
 SION, BARROW, ALASKA ...15.0014  
 WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
 AND PROGRESS ...16.0063  
 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS  
 ON PRECIPITATION - PART I ...16.0082  
 CLIMATES OF THE STATES - CLIMATE OF NEW YORK  
 ...16.0091

#### *CLOUDS*

##### *Cloud Ceiling*

MICROWAVE METEOROLOGY ...8.0104  
 ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
 NADOES AND HURRICANES ...16.0057

BY ATMOSPHERICS INCORPORATED (ABBREV)  
 ...2.0008  
 FLORIDA CUMULUS SEEDING EXPERIMENT FOR  
 DROUGHT MITIGATION, APRIL-MAY 1971 ...2.0010  
 METHODS FOR THE PREVENTION AND CONTROL OF  
 LIGHTNING FIRES ...5.0019  
 THE NATIONAL HAIL RESEARCH EXPERIMENT  
 SUMMER 1973 SUMMARY REPORT ...7.0011  
 TROPICAL CYCLONES ...8.0055  
 STUDIES OF CUMULUS HEATING AND THE CISK  
 MECHANISM ...8.0067  
 LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS  
 ...12.0025

#### *Cloud Cover*

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN  
 ...5.0045

#### *Cloud Motions - Movement*

INVESTIGATION OF SATELLITE OBSERVED TYPHOON-  
 HURRICANE CLOUD CLUSTERS AND FLOW FEAT-  
 URES ...8.0066  
 STUDIES OF CUMULUS HEATING AND THE CISK  
 MECHANISM ...8.0067

#### *Cloud Patterns*

INVESTIGATION OF SATELLITE OBSERVED TYPHOON-  
 HURRICANE CLOUD CLUSTERS AND FLOW FEAT-  
 URES ...8.0066  
 STUDIES OF CUMULUS HEATING AND THE CISK  
 MECHANISM ...8.0067

#### *Cloud Physics*

OKLAHOMA DROUGHT RELIEF OPERATIONAL PRO-  
 GRAM (ODROP) ...2.0006  
 THE NATIONAL HAIL RESEARCH EXPERIMENT  
 SUMMER 1973 SUMMARY REPORT ...7.0011  
 STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
 NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
 WISCONSIN ...7.0018  
 HURRICANE MODIFICATION ...8.0057  
 HURRICANE RESEARCH MODELING ...8.0061  
 HURRICANE MODELING ...8.0062

#### *Cloud Structure*

MICROWAVE METEOROLOGY ...8.0104

#### *CONVECTION*

THE INFLUENCE OF WEATHER AND CLIMATE ON  
 FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
 EAST AND SOUTH ...5.0043  
 FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN  
 ...5.0045

HURRICANE MODIFICATION ...8.0057  
 STUDIES OF CUMULUS HEATING AND THE CISK MECHANISM ...8.0067  
 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST) ...8.0087  
 USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES ...8.0098  
 THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES ...8.0099  
 MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS ...8.0120  
 CASE STUDIES OF COASTAL CONVECTIVE STORMS AS OBSERVED BY DOPPLER RADAR ...8.0121  
 NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...8.0125  
 ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS OF EXTRATROPICAL CYCLONES ...8.0137  
 ARIZONA 'EDDY' TORNADOES ...12.0010  
 PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-30, 1970 ...12.0024  
 LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS ...12.0025  
 DOPPLER RADAR METHODOLOGY FOR THE OBSERVATION OF CONVECTIVE STORMS ...12.0026  
 HURRICANE SPAWNED TORNADOES ...12.0028

#### DROUGHT

STUDY OF SEAWATER DESALTING AS EMERGENCY WATER SUPPLY FOR NEW YORK CITY ...2.0001  
 CENTRAL FLORIDA SEEDING PROJECT ...2.0003  
 STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER ...2.0004  
 JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT ...2.0005  
 OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM (ODROP) ...2.0006  
 HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007  
 PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV) ...2.0008  
 HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I ...2.0009  
 FLORIDA CUMULUS SEEDING EXPERIMENT FOR DROUGHT MITIGATION, APRIL-MAY 1971 ...2.0010  
 DROUGHT CLIMATOLOGY OF ILLINOIS ...2.0011

APPLICATIONS FOR THE FUTURE ...2.0016  
 ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017  
 THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018  
 DROUGHT AND WET SPELLS IN NORTH DAKOTA ...2.0020  
 DROUGHT PROBABILITIES IN TENNESSEE ...2.0023  
 METEOROLOGICAL DROUGHT IN TENNESSEE ...2.0024  
 FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA ...5.0016  
 THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043  
 ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA ...6.0035  
 PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT ...6.0210  
 EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...6.0341  
 WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006  
 ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...8.0124

#### FIRE WEATHER

FIRE WEATHER AND FIRE BEHAVIOR AT THE 1968 CANYON FIRE - CALIFORNIA ...5.0004  
 FOREST FIRES IN MISSOURI ...5.0015  
 FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA ...5.0016  
 NATIONAL FIRE DANGER RATING ...5.0027  
 RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION ...5.0029  
 OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA ...5.0031  
 FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034  
 PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL ...5.0039  
 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
 FOREST FIRE STATISTICAL PROBLEMS ...5.0041  
 DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007

DROUGHT AND WET SPELLS IN NORTH DAKOTA ...2.0020

RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION ...5.0029

OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA ...5.0031

PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL ...5.0039

WATER WARNINGS AND SPECIALIZED FORECASTS ...6.0081

LAKE HYDROLOGY ...6.0207

NATIONAL HURRICANE OPERATION PLAN ...8.0020

EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA ...8.0026

FURTHER VERIFICATIONS OF AND EXPERIMENTS TO IMPROVE THE MODIFIED HATRACK SCHEME FOR FORECASTING THE MOTION OF TROPICAL CYCLONES ...8.0052

TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES ...8.0053

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

HURRICANE RESEARCH MODELING ...8.0061

HURRICANE-TYPHOON DYNAMICS ...8.0063

STATISTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (AB-BREV) ...8.0070

A TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES ...8.0075

ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME I - 24 HOUR MOVEMENT ...8.0080

ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT ...8.0081

ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT ...8.0082

COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY ...8.0086

OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST) ...8.0087

CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088

PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL ...8.0089

GRAPHICAL DISPLAY OF HURRICANE FORECASTS ...8.0090

STATISTICAL-DYNAMICAL PREDICTION OF HURRICANE ...8.0092

STORM PREDICTION PROGRAM (TYPHOON 72) TOWARD SEVEN DAYS ...8.0105

VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF THE GOES SATELLITE ...8.0108

TROPICAL STORM SURGE FORECASTING ...8.0109

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - 1. LANDFALL STORMS ...8.0110

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS ...8.0111

MARINE ENVIRONMENTAL PREDICTION ...8.0113

MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972 ...8.0115

FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES ...8.0116

ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER) ...8.0122

SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE LISTING OF TROPICAL CYCLONES THAT HAVE AFFECTED SOUTH CAROLINA ...8.0127

A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES ...8.0130

THE DECISION PROCESS IN HURRICANE FORECASTING ...8.0131

FORECASTING STORM-INDUCED BEACH CHANGES ALONG VIRGINIA'S OCEAN COAST ...8.0134

STORM-SURGE FORECASTING ...8.0136

NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN ...11.0004

THE OCHELTREE TORNADO - A CASE STUDY - MISSOURI ...12.0003

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1974 ...12.0005

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN ...12.0012

NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN ...12.0013

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN - 1974 ...12.0014

TORNADOES ...12.0021

OBSERVATIONS OF SEVERE STORMS ON 26 AND 28 APRIL 1971 ...12.0022

EM RADIATION-TORNADOES ...12.0027

HURRICANE SPAWNED TORNADOES ...12.0028

FORECASTING GUSTY SURFACE WINDS IN THE CONTINENTAL UNITED STATES ...12.0029

STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032

DUST DEVIL METEOROLOGY ...12.0036

FEDERAL PLAN FOR WEATHER RADARS ...16.0068  
 FEDERAL PLAN FOR METEOROLOGICAL SERVICES &  
 SUPPORTING RESEARCH - FISCAL YEAR 1973  
 ...16.0069  
 FEDERAL PLAN FOR METEOROLOGICAL SERVICES &  
 SUPPORTING RESEARCH - FISCAL YEAR 1975  
 ...16.0070  
 PLAN TO IMPROVE LOCAL WEATHER FORECASTS  
 ...16.0072  
 OPERATIONS OF THE NATIONAL WEATHER SERVICE  
 ...16.0092

#### GRAVITY WAVES

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL  
 DISTURBANCES ...8.0099  
 MICRO AND MESOSCALE GEOPHYSICAL FLUID  
 DYNAMICS ...8.0120

#### HEAT BUDGET

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054  
 SEA-AIR INTERACTION LABORATORY OPERATIONS  
 ...8.0065  
 ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS  
 OF EXTRATROPICAL CYCLONES ...8.0137

#### HEAT EXCHANGE

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054  
 HURRICANE MODIFICATION ...8.0057  
 HURRICANE-OCEAN INTERACTION ...8.0064  
 SEA-AIR INTERACTION LABORATORY OPERATIONS  
 ...8.0065  
 HURRICANE MODIFICATION BY CLOUD SEEDING  
 ...8.0096  
 HURRICANE MODIFICATION RESEARCH (PROJECT  
 STORMFURY) ...8.0107  
 LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS  
 ...12.0025  
 DUST DEVIL METEOROLOGY ...12.0036  
 ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
 NADOES AND HURRICANES ...16.0057

#### HUMIDITY - WATER VAPOR

WATER YIELD IMPROVEMENT AND AVALANCHE  
 HAZARD PREDICTION IN ALPINE AREAS OF THE  
 ROCKY MOUNTAINS ...1.0011  
 THE GREAT OAKLAND, LOS ANGELES, AND SAN  
 DIEGO FIRES, SEPTEMBER 22 TO 29, 1970 ...5.0012  
 FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN  
 AND DEVELOPMENT ...5.0033

THE STRUCTURE AND DYNAMICS OF THE HUR-  
 RICANE'S INNER CORE REGION ...8.0069  
 MICROWAVE METEOROLOGY ...8.0104  
 PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-  
 30, 1970 ...12.0024  
 STUDY OF URBAN EFFECTS ON PRECIPITATION AND  
 SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032

#### INVERSION

FOREST FIRE METEOROLOGY IN THE PACIFIC  
 COASTAL REGION ...5.0040

#### LIGHTNING

FIRE MANAGEMENT SYSTEMS ...5.0007  
 METHODS FOR THE PREVENTION AND CONTROL OF  
 LIGHTNING FIRES ...5.0019  
 RADAR METEOROLOGY AS A MODERN TOOL FOR  
 FOREST FIRE PROTECTION ...5.0029  
 FOREST FIRE HISTORY - A COMPUTER METHOD OF  
 DATA ANALYSIS ...5.0038  
 THE INFLUENCE OF WEATHER AND CLIMATE ON  
 FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
 EAST AND SOUTH ...5.0043  
 FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
 AND MAPPING OF FIRES ...5.0046  
 HAIL AND LIGHTNING - COLORADO ...7.0012  
 EM RADIATION-TORNADOES ...12.0027

#### MACROMETEOROLOGY

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
 DISTURBANCES ...8.0098

#### MESOMETEOROLOGY

AVALANCHES ON THE NORTH CASCADES HIGHWAY  
 (SR-20) - SUMMARY REPORT ...1.0006  
 STUDIES OF URBAN EFFECTS ON RAINFALL AND  
 SEVERE WEATHER ...2.0004  
 FOREST FIRE METEOROLOGY IN THE PACIFIC  
 COASTAL REGION ...5.0040  
 HAIL AND LIGHTNING - COLORADO ...7.0012  
 STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
 NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
 WISCONSIN ...7.0018  
 INVESTIGATION OF SATELLITE OBSERVED TYPHOON-  
 HURRICANE CLOUD CLUSTERS AND FLOW-FEA-  
 TURES ...8.0066  
 MICRO AND MESOSCALE GEOPHYSICAL FLUID  
 DYNAMICS ...8.0120  
 THE MODIFICATION OF GREAT LAKES WINTER  
 STORMS ...11.0003

## METEOROLOGICAL CONDENSATION

### *Condensation Physics*

THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011

### *Fog - Haze - Mist*

BENEFITS OF ENVIRONMENTAL PREDICTION IN THE  
EASTERN GULF OF MEXICO ...8.0106

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

WEATHER MODIFICATION - FISCAL YEARS 1969, 1970,  
1971 ...16.0090

### *Frost*

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

### *Ice Crystals*

THE MODIFICATION OF GREAT LAKES WINTER  
STORMS ...11.0003

### *Rime*

THE MODIFICATION OF GREAT LAKES WINTER  
STORMS ...11.0003

## METEOROLOGICAL EXTREMES

DROUGHT PROBABILITIES IN TENNESSEE ...2.0023

SOUTH COASTAL BASIN PRECIPITATION FREQUENCY -  
A REGIONAL ANALYSIS OF DEPTH-DURATION  
FREQUENCY OF SHORT-DURATION PRECIPITATION  
IN CALIFORNIA ...6.0044

AN EVALUATION OF HURRICANE AGNES FLOODS IN  
COMPARISON TO BRIDGE DESIGN INFORMATION  
AVAILABLE FOR PENNSYLVANIA CONTEMPORANE-  
OUSLY ...6.0355

STORM CHARACTERISTICS AND RAINFALL INTENSITY  
IN WEST VIRGINIA ...6.0406

HYDROMETEOROLOGICAL ANALYSIS OF SEVERE  
RAINSTORMS - ILLINOIS ...12.0033

## METEOROLOGICAL PRECIPITATION

### *Hail and Sleet*

ESTIMATING CROP LOSSES DUE TO HAIL STATISTICAL  
SUPPLEMENT TO AGRICULTURAL ECONOMIC RE-  
PORT NO. 267 ...7.0001

MEASUREMENT AND ANALYSIS OF FARM RISKS,  
LOSSES, AND INSURANCE ...7.0002

A STUDY OF CROP-HAIL INSURANCE RECORDS FOR  
NORTHEASTERN COLORADO WITH RESPECT TO THE  
DESIGN OF THE NATIONAL HAIL EXPERIMENT  
...7.0003

SOYBEAN PHYSIOLOGY AND MANAGEMENT ...7.0004

WEATHER MODIFICATION - ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF  
SUPPRESSING HAIL ...7.0007

STUDIES OF HAIL DATA IN 1970-72 - ILLINOIS ...7.0008

NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT  
FOR 1973 - COLORADO ...7.0010

THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011

HAIL AND LIGHTNING - COLORADO ...7.0012

EXTENDED AREA EFFECTS FROM LOCAL WEATHER  
MODIFICATION ...7.0013

NATIONAL HAIL RESEARCH EXPERIMENT  
COLORADO, NEBRASKA, WYOMING ...7.0014

DESIGN OF HAIL SUPPRESSION EXPERIMENT IN IL-  
LINOIS ...7.0015

THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN  
NEVADA ...7.0016

TRACER STUDIES IN THE NATIONAL HAIL RESEARCH  
EXPERIMENT (NHRE) ...7.0017

STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
WISCONSIN ...7.0018

SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN  
...11.0005

ARIZONA 'EDDY' TORNADOES ...12.0010

PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-  
30, 1970 ...12.0024

ESTIMATE OF MAXIMUM WIND SPEEDS OF TOR-  
NADOES IN THREE NORTHWESTERN STATES -  
IDAHO, OREGON, WASHINGTON ...12.0030

STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH  
AMERICA ...12.0034

SUMMARY REPORT - WEATHER MODIFICATION -  
FISCAL YEARS 1969, 1970, 1971 ...16.0045

WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
AND PROGRESS ...16.0063

CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS  
ON PRECIPITATION - PART I ...16.0082

WEATHER MODIFICATION - FISCAL YEARS 1969, 1970,  
1971 ...16.0090

### *Precipitation*

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

OKLAHOMA DROUGHT RELIEF OPERATIONAL PRO-  
GRAM (ODROP) ...2.0006

POTENTIAL OF PRECIPITATION MODIFICATION IN  
MODERATE TO SEVERE DROUGHTS ...2.0012

SEVERITY AND FREQUENCY OF DROUGHT IN MISSIS-  
SIPPI ...2.0015

NEBRASKA DROUGHTS - A STUDY OF THEIR PAST  
CHRONOLOGICAL AND SPATIAL EXTENT WITH IM-  
PLICATIONS FOR THE FUTURE ...2.0016

METEOROLOGICAL AND HYDROLOGICAL ANALYSIS  
OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD  
...6.0021



- ...6.0074
- A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080
- THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166
- PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168
- URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169
- FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176
- FLOOD HYDROLOGY INVESTIGATIONS ...6.0183
- LAKE HYDROLOGY ...6.0207
- SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246
- CLIMATES OF THE STATES - CLIMATE OF NEW YORK ...6.0289
- PROBABLE MAXIMUM PRECIPITATION AND SNOW-MELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA ...6.0290
- HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319
- HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338
- FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349
- INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366
- BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368
- FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370
- FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION ...6.0391
- WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006
- EXTENDED AREA EFFECTS FROM LOCAL WEATHER MODIFICATION ...7.0013
- MICROWAVE METEOROLOGY ...8.0104
- BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO ...8.0106
- HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY) ...8.0107
- DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS ...12.0017
- STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032
- WEATHER AND CLIMATE MODIFICATION - PROBLEMS AND PROGRESS ...16.0063
- CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I ...16.0082
- FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT ...2.0005
- OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM (ODROP) ...2.0006
- PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV) ...2.0008
- HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I ...2.0009
- FLORIDA CUMULUS SEEDING EXPERIMENT FOR DROUGHT MITIGATION, APRIL-MAY 1971 ...2.0010
- BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014
- DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO ...2.0022
- DROUGHT PROBABILITIES IN TENNESSEE ...2.0023
- RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION ...5.0029
- METEOROLOGICAL AND HYDROLOGICAL ANALYSIS OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD ...6.0021
- FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023
- MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY ...6.0030
- FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034
- SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-DURATION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA ...6.0044
- FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048
- INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060
- AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066
- FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075
- URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076
- INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS ...6.0078
- FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082
- LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085
- HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE ...6.0103
- SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115
- INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129
- EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134

SMALL EASTERN WATERSHEDS ...6.0144  
 RUNOFF SIMULATION ...6.0156  
 FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187  
 FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS ALABAMA ...6.0214  
 FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0219  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222  
 HYDROGRAPH MODEL STUDIES OF THE HILLBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234  
 TIME-VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246  
 HYDROLOGIC RELATIONS IN HAWAII ...6.0247  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
 EFFECT OF URBANIZATION ON FLOOD RUNOFF - KANSAS CITY AREA ...6.0282  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296  
 DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGAN, NORTH CAROLINA ...6.0343  
 EVALUATION OF HURRICANE AGNES FLOODS IN COMPARISON TO BRIDGE DESIGN INFORMATION AVAILABLE FOR PENNSYLVANIA CONTEMPORANEOUSLY ...6.0355  
 FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365  
 INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371  
 AN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372  
 AN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS ...6.0375  
 AN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377  
 AN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383  
 AN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
 AN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386  
 VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS ...6.0387

STORM CHARACTERISTICS AND RAINFALL INTENSITY IN WEST VIRGINIA ...6.0406  
 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407  
 STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415  
 WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006  
 ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES ...8.0009  
 PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL ...8.0089  
 MICROWAVE METEOROLOGY ...8.0104  
 PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123  
 NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...8.0125  
 FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO ...11.0009  
 ARIZONA 'EDDY' TORNADOES ...12.0010  
 DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS ...12.0017  
 LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS ...12.0025  
 HYDROMETEOROLOGICAL ANALYSIS OF SEVERE RAINSTORMS - ILLINOIS ...12.0033  
 STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA ...12.0034  
 SOME STATISTICAL ASPECTS OF WATERSPOUT FORMATION - FLORIDA ...12.0039  
 RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) ...14.0015  
 PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035  
 SUMMARY REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0045  
 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I ...16.0082  
 WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0090

#### Snow

AVALANCHE STUDIES, 1971-1972 ...1.0001  
 WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011  
 LAKE HYDROLOGY ...6.0207  
 CLIMATES OF THE STATES - CLIMATE OF NEW YORK ...6.0289  
 THE MODIFICATION OF GREAT LAKES WINTER STORMS ...11.0003  
 NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN ...11.0004

THE CASCADE PROJECT ...11.0007  
 FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO ...11.0009  
 LOCAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035  
 ANNUAL REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0045  
 ANALYTICAL SIMULATION OF MESSAGE TRAFFIC FOR LOCAL DISASTER WARNING COMMUNICATIONS - MISSOURI ...16.0047  
 WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0090

#### MICROMETEOROLOGY

WEATHER AND FIRE BEHAVIOR AT THE 1968 FIRE IN CALIFORNIA ...5.0004  
 FIRES IN MISSOURI ...5.0015  
 WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE IN MINNESOTA ...5.0016  
 FIRE FIGHTING PLAN FOR FIRE WEATHER SERVICE IN NORTH CAROLINA ...5.0031  
 RELIABILITY OF FIRE WEATHER FORECASTS SHOWN IN A 3-YEAR TRIAL ...5.0039  
 LOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338  
 MESOSCALE AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS ...8.0120  
 STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC TUNDRA PLAIN PROVINCE, NORTHERN ALASKA ...10.0025

#### MODEL STUDIES

DRY AND WET SPELLS IN NORTH DAKOTA ...10.0020

#### SEASONAL STUDIES

GREAT OAKLAND, LOS ANGELES, AND SAN JOSE FIRES, SEPTEMBER 22 TO 29, 1970 ...5.0012  
 LOCAL FIRE DANGER RATING ...5.0027  
 FIRES CAUSED BY EQUIPMENT USED DURING CRUISE - FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034  
 FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
 PERSISTENT RAINFALL AND SNOWMELT FLOODS ON THE MIDWESTERN WATERSHEDS ...6.0113  
 LOCAL ANTECEDENT PRECIPITATION INDICES FOR THE EASTERN WATERSHEDS ...6.0144  
 SEEDLING POTENTIAL FOR TWELVE RIVER WATERSHEDS ...6.0171

STORM CHARACTERISTICS AND RAINFALL INTENSITY IN WEST VIRGINIA ...6.0406  
 THE NATIONAL HAIL RESEARCH EXPERIMENT - SUMMER 1973 SUMMARY REPORT ...7.0011  
 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA ...8.0002  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME I - 24 HOUR MOVEMENT ...8.0080  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT ...8.0081  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT ...8.0082  
 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST) ...8.0087  
 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER) ...8.0122

SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE LISTING OF TROPICAL CYCLONES THAT HAVE AFFECTED SOUTH CAROLINA ...8.0127  
 NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO ...8.0138  
 STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA ...12.0034  
 BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 ...12.0038  
 SOME STATISTICAL ASPECTS OF WATERSPOUT FORMATION - FLORIDA ...12.0039  
 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I ...16.0082

#### SUNSHINE

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033  
 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076

#### SYNOPTIC WEATHER OBSERVATIONS

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
 INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES ...8.0066  
 USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES ...8.0098  
 A SYNOPTIC CLIMATOLOGY FOR SNOWSTORMS IN NORTHWESTERN NEVADA ...11.0006  
 THE OCHEL TREE TORNADO - A CASE STUDY - MISSOURI ...12.0003  
 LIFE CYCLE OF FLORIDA KEYS' WATERSPOUTS ...12.0025

## *Meteorology*

HYDROMETEOROLOGICAL ANALYSIS OF SEVERE  
RAINSTORMS - ILLINOIS ...12.0033  
STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH  
AMERICA ...12.0034

### *TECHNIQUES AND INSTRUMENTATION*

PLAN TO IMPROVE LOCAL WEATHER FORECASTS  
...16.0072

#### *Aircraft*

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046  
NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT  
FOR 1973 - COLORADO ...7.0010  
THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011  
NATIONAL HURRICANE OPERATION PLAN ...8.0020  
TROPICAL METEOROLOGIC PROBLEMS ...8.0058  
SEA-AIR INTERACTION LABORATORY OPERATIONS  
...8.0065  
THE STRUCTURE AND DYNAMICS OF THE HUR-  
RICANE'S INNER CORE REGION ...8.0069  
NATIONAL EAST COAST WINTER STORMS OPERATIONS  
PLAN ...11.0004  
NATIONAL EAST COAST WINTER STORMS - OPERA-  
TIONS PLAN ...12.0013

#### *Automatic Stations - Networks*

NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT  
FOR 1973 - COLORADO ...7.0010  
MORPHOLOGY OF TWO TORNADIC STORMS - AN  
ANALYSIS OF NSSL DATA ON APRIL 30, 1970 -  
OKLAHOMA CITY, OKLAHOMA ...12.0007  
NATIONAL SEVERE LOCAL STORMS OPERATIONS  
PLAN ...12.0012  
DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS  
...12.0017

#### *Evaporation Instruments*

HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM  
SYSTEM ...6.0104

#### *Humidity Instruments*

RUNOFF FROM SMALL AGRICULTURAL AREAS IN IL-  
LINOIS ...6.0265

#### *Optical Instruments*

THE INFLUENCE OF WEATHER AND CLIMATE ON  
FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE  
EAST AND SOUTH ...5.0043

#### *Photography*

ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
NADOES AND HURRICANES ...16.0057

#### *Radar*

STUDIES OF URBAN EFFECTS ON RAINFALL AND

PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD  
SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED  
BY ATMOSPHERICS INCORPORATED (ABBREV)  
...2.0008

STUDIES OF HAIL DATA IN 1970-72 - ILLINOIS ...7.0008

NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT  
FOR 1973 - COLORADO ...7.0010

THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011

DESIGN OF HAIL SUPPRESSION EXPERIMENT IN IL-  
LINOIS ...7.0015

STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
WISCONSIN ...7.0018

NATIONAL HURRICANE OPERATION PLAN ...8.0020

THE STRUCTURE AND DYNAMICS OF THE HUR-  
RICANE'S INNER CORE REGION ...8.0069

CASE STUDIES OF COASTAL CONVECTIVE STORMS AS  
OBSERVED BY DOPPLER RADAR ...8.0121

PRELIMINARY CLIMATIC DATA REPORT HURRICANE  
AGNES JUNE 14-23, 1972 ...8.0123

THE OCHEL TREE TORNADO - A CASE STUDY - MISSOU-  
RI ...12.0003

MORPHOLOGY OF TWO TORNADIC STORMS - AN  
ANALYSIS OF NSSL DATA ON APRIL 30, 1970 -  
OKLAHOMA CITY, OKLAHOMA ...12.0007

NATIONAL SEVERE LOCAL STORMS OPERATIONS  
PLAN ...12.0012

OBSERVATIONS OF SEVERE STORMS ON 26 AND 28  
APRIL 1971 ...12.0022

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

DOPPLER RADAR METHODOLOGY FOR THE OBSERVA-  
TION OF CONVECTIVE STORMS ...12.0026

HYDROMETEOROLOGICAL ANALYSIS OF SEVERE  
RAINSTORMS - ILLINOIS ...12.0033

COMPUTER SIMULATION OF SEVERE STORM OBSER-  
VATIONS WITH DOPPLER RADARS ...12.0041

FEDERAL PLAN FOR WEATHER RADARS ...16.0046

FEDERAL PLAN FOR WEATHER RADARS ...16.0068

#### *Radiosondes - Rawinsondes*

FLORIDA CUMULUS SEEDING EXPERIMENT FOR  
DROUGHT MITIGATION, APRIL-MAY 1971 ...2.0010

HURRICANE-TYPHOON DYNAMICS ...8.0063

INVESTIGATION OF SATELLITE OBSERVED TYPHOON-  
HURRICANE CLOUD CLUSTERS AND FLOW FEAT-  
URES ...8.0066

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-  
30, 1970 ...12.0024

#### *Rain Gages*

JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM  
FOR MITIGATION OF 1971 SOUTH FLORIDA  
DROUGHT ...2.0005

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFOR-

FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102

HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104

FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106

DESIGN OF OPTIMAL PRECIPITATION NETWORKS ...6.0107

INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140

PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168

FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186

FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187

PEAK FLOW FROM SMALL DRAINAGE AREAS - CONNECTICUT ...6.0210

HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323

FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349

FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365

INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384

DRAINAGE BASINS IN WYOMING ...6.0415

STUDIES OF HAIL DATA IN 1970-72 - ILLINOIS ...7.0008

DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS ...12.0017

### *Satellites*

NATIONAL HURRICANE OPERATION PLAN ...8.0020

TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES ...8.0053

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES ...8.0066

A TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES ...8.0075

BAROTROPIC PREDICTION OF HURRICANE TRACKS ...8.0093

USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES ...8.0098

MICROWAVE METEOROLOGY ...8.0104

PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123

NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN ...11.0004

NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN ...12.0013

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE ...16.0047

DISASTER WARNING SATELLITE STUDY ...16.0048

WEATHER SATELLITE CAPABILITIES - PRESENT AND FUTURE ...16.0067

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1973 ...16.0069

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1975 ...16.0070

### *Temperature Instruments*

PHYSICAL PROPERTIES OF ALPINE SNOW AS RELATED TO WEATHER AND AVALANCHE CONDITIONS ...1.0012

THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032

BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 ...12.0038

EXPERIMENT (NHRE) ...7.0017

### *Weather Sensing Instruments*

BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 ...2.0038

### *Wind Meters*

WINDS OFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

HURRICANE EFFECTS ON PORT FACILITIES ...8.0076

### THERMODYNAMICS

NATIONAL HAIL RESEARCH EXPERIMENT SUMMER 1973 SUMMARY REPORT ...7.0011

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

HURRICANE MODIFICATION ...8.0057

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

WARM SURGE RESEARCH ...8.0060

HURRICANE-TYPHOON DYNAMICS ...8.0063

STUDIES OF CUMULUS HEATING AND THE CISK MECHANISM ...8.0067

STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION ...8.0069

HURRICANE MODIFICATION BY CLOUD SEEDING ...8.0096

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES ...8.0099

HURRICANE MODIFICATION RESEARCH (PROJECT FORMFURY) ...8.0107

ANALYTICAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS ...8.0110

ANALYTICAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS ...8.0111

THUNDER STORM MORPHOLOGY - OKLAHOMA ...12.0023

STUDIES ON OKLAHOMA THUNDERSTORMS, APRIL 29 - MAY 1, 1970 ...12.0024

THE CYCLE OF FLORIDA KEYS' WATERSPOUTS ...12.0025

THE DEVIL METEOROLOGY ...12.0036

ESTIMATION OF MAXIMUM WIND SPEEDS IN TORNADOES AND HURRICANES ...16.0057

### VORTICITY

CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088

NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...13.0000

### WEATHER CHARTS, MAPS

PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123

SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE LISTING OF TROPICAL CYCLONES THAT HAVE AFFECTED SOUTH CAROLINA ...8.0127

OBJECTIVE ANALYSIS OF THE SEA SURFACE TEMPERATURE ...8.0129

THE OCHEL TREE TORNADO - A CASE STUDY - MISSOURI ...12.0003

TORNADO INCIDENCE MAPS ...12.0008

TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880-1970) ...12.0009

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN ...12.0012

FORECASTING GUSTY SURFACE WINDS IN THE CONTINENTAL UNITED STATES ...12.0029

HYDROMETEOROLOGICAL ANALYSIS OF SEVERE RAINSTORMS - ILLINOIS ...12.0033

### WEATHER DATA

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI ...2.0015

DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO ...2.0022

PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...5.0002

FOREST FIRES IN MISSOURI ...5.0015

FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA ...5.0016

RESEARCH AND DEVELOPMENT OF FIRE PREVENTION TECHNOLOGY (FIRE PREVENTION) ...5.0017

FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034

PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL ...5.0039

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

FOREST FIRE STATISTICAL PROBLEMS ...5.0041

DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-DURATION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA ...6.0044

FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113

SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246

PROBABLE MAXIMUM PRECIPITATION AND SNOW-MELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA ...6.0290

STORM CHARACTERISTICS AND RAINFALL INTENSITY IN WEST VIRGINIA ...6.0406

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407

NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT FOR 1973 - COLORADO ...7.0010

STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN ...7.0018

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

HURRICANE MODELING ...8.0062

A SURVEY OF AVAILABILITY OF HURRICANE/TYPHOON PACKAGES AND ASSOCIATED DATA ...8.0071

BAROTROPIC PREDICTION OF HURRICANE TRACKS ...8.0093

USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES ...8.0098

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES ...8.0099

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS ...8.0111

FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES ...8.0116

PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123

NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN ...11.0004

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1974 ...12.0005

MORPHOLOGY OF TWO TORNADIC STORMS - AN ANALYSIS OF NSSL DATA ON APRIL 30, 1970 - OKLAHOMA CITY, OKLAHOMA ...12.0007

TORNADO INCIDENCE MAPS ...12.0008

TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880-1970) ...12.0009

ARIZONA 'EDDY' TORNADOES ...12.0010

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN ...12.0012

DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS ...12.0017

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

EM RADIATION-TORNADOES ...12.0027

PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY ...12.0031

THOUSAND UNITED STATES ...12.0037

SOME STATISTICAL ASPECTS OF WATERSPOUT FORMATION - FLORIDA ...12.0039

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE ...16.0047

PLAN TO IMPROVE LOCAL WEATHER FORECASTS ...16.0072

## WEATHER MODIFICATION

DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS ...12.0017

ESSA AND OPERATION FORESIGHT ...16.0043

A COMPARATIVE ANALYSIS OF PUBLIC SUPPORT OF AND RESISTANCE TO WEATHER MODIFICATION PROJECTS ...16.0061

WEATHER & CLIMATE MODIFICATION PROBLEMS AND PROGRESS ...16.0066

WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0090

## Clouds - Precipitation

METHODS FOR THE PREVENTION AND CONTROL OF LIGHTNING FIRES ...5.0019

CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS ...6.0171

A STUDY OF CROP-HAIL INSURANCE RECORDS FOR NORTHEASTERN COLORADO WITH RESPECT TO THE DESIGN OF THE NATIONAL HAIL EXPERIMENT ...7.0003

WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL ...7.0007

THE NATIONAL HAIL RESEARCH EXPERIMENT SUMMER 1973 SUMMARY REPORT ...7.0011

EXTENDED AREA EFFECTS FROM LOCAL WEATHER MODIFICATION ...7.0013

NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING ...7.0014

TRACER STUDIES IN THE NATIONAL HAIL RESEARCH EXPERIMENT (NHRE) ...7.0017

STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN ...7.0018

HURRICANE MODIFICATION ...8.0057

ATLANTIC TROPICAL SYSTEMS OF 1972 ...8.0084

HURRICANE DEBBIE MODIFICATION EXPERIMENTS, AUGUST 1969 ...8.0085

HURRICANE MODIFICATION BY CLOUD SEEDING ...8.0096

HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY) ...8.0107

THE MODIFICATION OF GREAT LAKES WINTER STORMS ...11.0003

FISCAL YEARS 1969, 1970, 1971 ...16.0045

WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
AND PROGRESS ...16.0063

### *Nuclear Blast Effects*

NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

### *Nucleation Physics*

CENTRAL FLORIDA SEEDING PROJECT ...2.0003

JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM  
FOR MITIGATION OF 1971 SOUTH FLORIDA  
DROUGHT ...2.0005

OKLAHOMA DROUGHT RELIEF OPERATIONAL PRO-  
GRAM (ODROP) ...2.0006

PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD  
SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED  
BY ATMOSPHERICS INCORPORATED (ABBREV)  
...2.0008

HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I  
...2.0009

FLORIDA CUMULUS SEEDING EXPERIMENT FOR  
DROUGHT MITIGATION, APRIL-MAY 1971 ...2.0010

POTENTIAL OF PRECIPITATION MODIFICATION IN  
MODERATE TO SEVERE DROUGHTS ...2.0012

METHODS FOR THE PREVENTION AND CONTROL OF  
LIGHTNING FIRES ...5.0019

TRACER STUDIES IN THE NATIONAL HAIL RESEARCH  
EXPERIMENT (NHRE) ...7.0017

STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
WISCONSIN ...7.0018

HURRICANE DEBBIE MODIFICATION EXPERIMENTS,  
AUGUST 1969 ...8.0085

THE MODIFICATION OF GREAT LAKES WINTER  
STORMS ...11.0003

### *Storm Modification*

STUDIES OF URBAN EFFECTS ON RAINFALL AND  
SEVERE WEATHER ...2.0004

WEATHER MODIFICATION IN NORTH DAKOTA ...7.0006

ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF  
SUPPRESSING HAIL ...7.0007

HAIL AND LIGHTNING - COLORADO ...7.0012

NATIONAL HAIL RESEARCH EXPERIMENT -  
COLORADO, NEBRASKA, WYOMING ...7.0014

TRACER STUDIES IN THE NATIONAL HAIL RESEARCH  
EXPERIMENT (NHRE) ...7.0017

STUDY OF THE FEATURES AND ENERGY BUDGETS OF  
NORTHEASTERN COLORADO HAILSTORMS - ALSO,  
WISCONSIN ...7.0018

FURTHER VERIFICATIONS OF AND EXPERIMENTS TO  
IMPROVE THE MODIFIED HATRACK SCHEME FOR  
FORECASTING THE MOTION OF TROPICAL  
CYCLONES ...8.0052

PROJECT STORMFURY ANNUAL REPORT 1971 ...8.0095

HURRICANE MODIFICATION BY CLOUD SEEDING  
...8.0096

MICROWAVE METEOROLOGY ...8.0104

HURRICANE MODIFICATION RESEARCH (PROJECT  
STORMFURY) ...8.0107

NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH  
...8.0117

THE MODIFICATION OF GREAT LAKES WINTER  
STORMS ...11.0003

FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZ-  
ZLE IN OHIO ...11.0009

TORNADOES ...12.0021

WEATHER AND CLIMATE MODIFICATION - PROBLEMS  
AND PROGRESS ...16.0063

### *Wind*

STABILITY AND DYNAMIC RESPONSE OF COOLING  
TOWERS ...3.0068

SEISMIC BEHAVIOR OF FRAMED TUBES ...3.0207

THE GREAT OAKLAND, LOS ANGELES, AND SAN  
DIEGO FIRES, SEPTEMBER 22 TO 29, 1970 ...5.0012

FORECASTING RAINFALL AND SNOWMELT FLOODS ON  
UPPER MIDWESTERN WATERSHEDS ...6.0113

THE NATIONAL HAIL RESEARCH EXPERIMENT  
SUMMER 1973 SUMMARY REPORT ...7.0011

THE NATURE AND EXTENT OF STRUCTURAL DAMAGE  
CAUSED BY HURRICANE CAMILLE ...8.0007

FORECASTING STORM-INDUCED BEACH CHANGES  
ALONG VIRGINIA'S OCEAN COAST ...8.0134

NUMERICAL STUDIES IN THE CIRCULATIONS AND  
STORM SURGES IN LAKE ONTARIO ...8.0138

LUBBOCK TORNADO - A SURVEY OF BUILDING  
DAMAGE IN AN URBAN AREA - TEXAS ...12.0004

ARIZONA 'EDDY' TORNADOES ...12.0010

SEVERE STORM MORPHOLOGY - OKLAHOMA ...12.0023

STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH  
AMERICA ...12.0034

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS  
AND TESTIMONY - VOLUME V ...13.0006

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

CLIMATES OF THE STATES - CLIMATE OF NEW YORK  
...16.0091

SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

### *Jet Stream*

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098



THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

#### *Orographic Effects*

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0045

EXTENDED AREA EFFECTS FROM LOCAL WEATHER MODIFICATION ...7.0013

#### *Wind Direction*

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088

BAROTROPIC PREDICTION OF HURRICANE TRACKS ...8.0093

WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS ...12.0018

BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 ...12.0038

RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) ...14.0015

#### *Wind Profiles*

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS ...8.0059

PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN ...8.0118

#### *Wind Shear*

HURRICANE-OCEAN INTERACTION ...8.0064

MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS ...8.0120

HURRICANE SPAWNED TORNADOES ...12.0028

BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 ...12.0038

#### *Wind Velocity*

PHYSICAL PROPERTIES OF ALPINE SNOW AS RELATED TO WEATHER AND AVALANCHE CONDITIONS ...1.0012

BUILDING PRACTICES FOR DISASTER MITIGATION ...3.0188

FIRE WEATHER AND FIRE BEHAVIOR AT THE 1968 CANYON FIRE - CALIFORNIA ...5.0004

DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS ...5.0044

FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN ...5.0045

SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042

URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969 ...8.0014

MEMORABLE HURRICANES OF THE UNITED STATES SINCE 1973 ...8.0016

A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS ...8.0059

HURRICANE RESEARCH MODELING ...8.0061

THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION ...8.0069

HURRICANE CAMILLE - AUGUST 1969 ...8.0074

HURRICANE EFFECTS ON PORT FACILITIES ...8.0076

DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS ...8.0077

WIND AND SURGE DAMAGE DUE TO HURRICANE CAMILLE ...8.0078

HURRICANE DEBBIE MODIFICATION EXPERIMENTS, AUGUST 1969 ...8.0085

BAROTROPIC PREDICTION OF HURRICANE TRACKS ...8.0093

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES ...8.0102

MICROWAVE METEOROLOGY ...8.0104

HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY) ...8.0107

FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES ...8.0116

FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO ...11.0009

WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS ...12.0018

NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS ...12.0019

PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL, 29-30, 1970 ...12.0024

FORECASTING GUSTY SURFACE WINDS IN THE CONTINENTAL UNITED STATES ...12.0029

ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON ...12.0030

PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY ...12.0031

BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 ...12.0038

RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) ...14.0015

PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035

ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TORNADOES AND HURRICANES ...16.0057

BUILDING PRACTICES FOR DISASTER MITIGATION ...16.0073

### Methods

*See Buildings & Land Development  
Construction*

### Metropolitan Areas

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073

EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374

DENVER METROPOLITAN AREA, COLORADO ...9.0042

### Microbiology

*See Soil Science and Mechanics*

### Micrometeorology

*See Meteorology*

### Microseismology

*See Geophysics  
Seismology*

### Microseisms - Background Noise

*See Geophysics  
Seismology*

*See Techniques and Instrumentation  
Remote Sensing*

### Microwave Techniques

*See Electronic Systems*

### Military Personnel

*See Occupations, Populations*

### Mine Engineering

*See Economic Geology  
Mining Studies*

### Mineralogical Composition

*See Sedimentology  
Sediment Properties*

### Minerals

#### CLAY MINERALS

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...2.0019

REVIEW OF LITERATURE ON EXPANSIVE CLAY MINERALS ...4.0003

MAPPING OF SURFACE MATERIALS FOR PREDICTING FOUNDATION CHARACTERISTICS IN THE DEVELOPMENT OF HATTIESBURG ...4.0009

THE INFLUENCE OF CLAY MINERALS ON SURFACE EARTH MOVEMENTS ...9.0056

ENVIRONMENTAL INFLUENCES ON STABILITY OF CLAY MASSES - ALASKA AND OHIO ...9.0060

CONTROL OF LAND SUBSIDENCE IN THE TEXAS COAST AREA ...10.0032

#### HALIDES

HAMILTON 2 DEGREE ...9.0048

### Mining

*See Buildings & Land Development  
Building Classification*

## **Mining Studies**

*See Economic Geology*

## **Mobile Homes**

*See Buildings & Land Development  
Building Classification*

## **Mobility**

*See Social Sciences*

## **Model Cities**

MODEL CITIES ONE - URBAN RENEWAL PROJECT,  
READING, PENNSYLVANIA ...6.0025

## **Model Studies**

*See Hydraulics*  
*See Mechanics of Structures*  
*See Meteorology*  
*See Soil Science and Mechanics*  
*Techniques and Instrumentation*  
*See Techniques and Instrumentation*

## **Models**

*See Buildings & Land Development*  
*See Transportation Engineering*  
*Basic Studies*

## **Moments**

*See Engineering Mechanics*

## **Monitoring**

*See Techniques and Instrumentation*

## **Monographs**

*See Publications*

## **Mountains**

AVALANCHE STUDIES, 1971-1972 ...1.0001

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

FOREST FIRE METEOROLOGY IN THE PACIFIC  
COASTAL REGION ...5.0040

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

EFFECTS OF DEFORESTATION ON THE STABILITY OF  
NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

## **Mud Flow - Sheetwash**

*See Geomorphology*  
*Mass Wasting*

## **Multiple Purpose Projects**

*See Water Resources Management*

## **Multiple Purpose Reservoirs**

*See Reservoirs and Impoundments*

## **National and Civil Defense**

### **CIVIL DEFENSE**

INELASTIC RESPONSE OF BUILDINGS AND STRUC-  
TURAL RESTORATION ...3.0190

### **NUCLEAR WARFARE**

THE DEVELOPMENT OF A MEANS FOR ASSESSING  
EMERGENCY MEDICAL RESOURCES ...16.0052

## **National Income**

*See Economics*  
*Income Analysis*

*See Economic Geology*  
*Non-metallic Deposits*

### Navigation

*See Oceanography*  
*Ocean Engineering Studies*

### Niches

*See Ecology*

### Non-clastic Sediments

*See Sedimentology*  
*Sedimentary Rocks*

### Non-metallic Deposits

*See Economic Geology*

### Nuclear Blast Effects

*See Geophysics*  
*Seismology*  
*See Meteorology*  
*Weather Modification*

### Nuclear Energy

*See Energy Conversion*

### Nuclear Moisture Meters

*See Techniques and Instrumentation*

### Nuclear Power

*See Mechanical Power & Equipment*

### Nuclear Reactors

NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

REACTOR DESIGN ...  
HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES ...3.0056

SEISMIC RESEARCH ...3.0225

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

### Nuclear Warfare

*See National and Civil Defense*

### Nucleation Physics

*See Meteorology*  
*Weather Modification*

### Nutrients

*See Water Quality*  
*Pollution Sources*

### Observation Wells

*See Techniques and Instrumentation*

### Occupations, Populations

#### ENFORCEMENT PERSONNEL

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE  
OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME  
OPERATION STRUCTURE AND PROCEDURES ...16.0003

#### FAMILIES

SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL  
EFFECTS ...6.0003

#### FARMERS

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL  
FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA ...6.0010

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA ...6.0011

#### MARITAL STATUS

LEVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS ...6.0003

#### MILITARY PERSONNEL

ODDY RECOVERY DOG ...16.0008

DISASTER RELIEF - DOMESTIC ACTION IN THE SPOTLIGHT ...16.0101

#### PARAMEDICAL PERSONNEL

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA ...6.0011

DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION ...16.0003

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES ...16.0013

#### PHYSICIANS

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES ...16.0013

#### POLICE

ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES ...16.0100

#### SOCIAL WORKERS

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA ...6.0008

TRAINING AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA ...6.0010

CONSULTATIVE PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN RAPID CITY, SOUTH DAKOTA ...16.0002

TRAINING PROGRAM FOR CRISIS INTERVENORS ...16.0020

### Ocean Circulation

*See Oceanography*  
*Sea Water Motion*

### Ocean Coring and Dredging

*See Oceanography*  
*Oceanographic Techniques*

### Ocean Currents

*See Oceanography*  
*Sea Water Motion*

### Ocean Dumping

*See Oceanography*  
*Marine Pollution*

### Ocean Energy

*See Oceanography*  
*Sea Water Motion*

### Ocean Engineering Studies

*See Oceanography*

### Ocean Hydrodynamics

*See Oceanography*  
*Sea Water Motion*

### Ocean Meteorological Studies

*See Oceanography*

### Ocean Mixing

*See Oceanography*  
*Sea Water Motion*

### Ocean Sediments

*See Oceanography*  
*Marine Geology*

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

INVESTIGATION OF LANDSLIDES ON HIGHWAYS  
...9.0014

## **Ocean Surface Environment**

HURRICANE-OCEAN INTERACTION ...8.0064

## **Oceanographic Instrumentation**

*See Oceanography*

## **Oceanographic Techniques**

*See Oceanography*

## **Oceanography**

### **AIR - SEA BOUNDARY STUDIES**

MICRO AND MESOSCALE GEOPHYSICAL FLUID  
DYNAMICS ...8.0120

ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
NADOES AND HURRICANES ...16.0057

### *Heat and Radiation Transfer*

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

HURRICANE MODIFICATION ...8.0057

HURRICANE-OCEAN INTERACTION ...8.0064

SEA-AIR INTERACTION LABORATORY OPERATIONS  
...8.0065

### *Particle - Gas Transfer*

HURRICANE MODIFICATION ...8.0057

### *Wind - Water Interaction*

SURVEY OF GULF COAST STRUCTURAL DAMAGE  
RESULTING FROM HURRICANE CAMILLE, AUGUST  
1969 ...8.0014

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

HURRICANE-OCEAN INTERACTION ...8.0064

STUDIES OF CUMULUS HEATING AND THE CISK  
MECHANISM ...8.0067

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098

MARINE ENVIRONMENTAL PREDICTION ...8.0113

NUMERICAL STUDIES IN THE CIRCULATIONS AND  
STORM SURGES IN LAKE ONTARIO ...8.0138

SAN FRANCISCO BAY ...15.0013

## **GEOPHYSICAL OCEANOGRAPHY**

### *Heat Flow Measurements*

SEA-AIR INTERACTION LABORATORY OPERATIONS  
...8.0065

### *Magnetic Studies*

MONTEREY BAY - CALIFORNIA ...9.0030

### *Seismic Studies*

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL  
MARGIN - ALASKA ...3.0131

EARTH STRUCTURE AND FAULT TECTONICS AS RE-  
LATED TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF  
SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES  
...3.0261

BUILDING STANDARDS AND THE EARTHQUAKE  
HAZARD FOR THE PUGET SOUND BASIN ...3.0281

MONTEREY BAY - CALIFORNIA ...9.0030

TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND  
CALIFORNIA ...13.0011

TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COM-  
MUNITIES - TYPE 16 FLOOD INSURANCE STUDY  
...13.0028

## **MARINE GEOLOGY**

### *Bottom Topography*

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...6.0341

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES  
FROM HURRICANES - I. LANDFALL STORMS ...8.0110

JAMAICA BAY HURRICANE BARRIER STUDY NEW  
YORK ...8.0119

NUMERICAL STUDIES IN THE CIRCULATIONS AND  
STORM SURGES IN LAKE ONTARIO ...8.0138

### *Continental Shelves*

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFOR-  
NIA ...3.0120

NUMERICAL SIMULATION OF TSUNAMIS ...13.0020

### *Continental Slopes*

NUMERICAL SIMULATION OF TSUNAMIS ...13.0020

TION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA ...8.0025

BEACH CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE ...8.0103

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043

BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE ...15.0010

SAN FRANCISCO BAY ...15.0013

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

OFFSET COASTAL INLETS - FORMS OF SEDIMENT ACCUMULATION IN THE BEACH ZONE - ALASKA, NEW ENGLAND ...15.0022

TEXAS BARRIER ISLANDS ...15.0037

### *Stratigraphy*

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128

### *Sub-bottom Structure*

COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS ...15.0016

### *Submarine Canyons*

MONTEREY BAY - CALIFORNIA ...9.0030

### *Submarine Faults*

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA ...3.0132

### *Turbidity Currents*

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...3.0175

### *MARINE POLLUTION*

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

### *Ocean Dumping*

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

### *Petroleum Wastes - Spillage*

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182  
ANALYTICAL PHYSICAL MODEL ...8.0126

DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116

LAKE HYDROLOGY ...6.0207

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS ...6.0298

DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION ...8.0041

GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045

GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION ...13.0010

REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974 ...16.0040

### *Shoreline Structures*

COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION ...15.0001

COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA ...15.0015

COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS ...15.0016

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...15.0029

### *OCEAN METEOROLOGICAL STUDIES*

HURRICANE MODIFICATION ...8.0057

HURRICANE-OCEAN INTERACTION ...8.0064

SEA-AIR INTERACTION LABORATORY OPERATIONS ...8.0065

ESTUARIES OF THE NORTH CAROLINA COAST  
...15.0029

## OCEANOGRAPHIC INSTRUMENTATION

### *Bathythermographs*

PROJECT STORMFURY ANNUAL REPORT 1971 ...8.0095

### *Bottom Sampling Devices*

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120

MONTEREY BAY - CALIFORNIA ...9.0030

### *Buoys*

NATIONAL HURRICANE OPERATION PLAN ...8.0020

SEA-AIR INTERACTION LABORATORY OPERATIONS  
...8.0065

### *Deep Submersibles*

MONTEREY BAY - CALIFORNIA ...9.0030

### *Physical Instruments*

TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA ...13.0011

### *Platforms*

MONTEREY BAY - CALIFORNIA ...3.0116

PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO ...8.0051

SEA-AIR INTERACTION LABORATORY OPERATIONS  
...8.0065

NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN ...11.0004

NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN ...12.0013

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

### *Sonar*

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

### *Water Motion Recorders*

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

## OCEANOGRAPHIC TECHNIQUES

### *Bathymetry*

ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027

PROJECT STORMFURY ANNUAL REPORT 1971 ...8.0095

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA ...3.0131

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

ANALYTICAL PHYSICAL MODEL ...8.0126

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST  
...15.0029

### *Profiles*

COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS ...15.0016

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

### *Sea Water Sampling*

ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027

### *Ships and Cruises*

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA ...3.0131

### *Tracers*

GALVESTON BAY HURRICANE SURGE - REPORT 1 EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

GALVESTON BAY HURRICANE SURGE - REPORT 3 EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

GALVESTON BAY HURRICANE SURGE - REPORT 2 EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

SEA-AIR INTERACTION LABORATORY OPERATIONS  
...8.0065

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

### OFFSHORE OIL

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0102

### SEA WATER CHEMISTRY

### *Salinity*

ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES ...8.0009

TEXAS COAST HURRICANE SURGE MODEL STUDIES  
...8.0013



TIES, AND DYE DISPERSION (ABBREV) ...8.0039  
GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

ANALYTICAL PHYSICAL MODEL ...8.0126

#### *Sea Water Analysis*

SAN FRANCISCO BAY ...15.0013

#### *SEA WATER MOTION*

##### *Ocean Circulation*

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

HURRICANE-OCEAN INTERACTION ...8.0064

MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS ...8.0120

NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO ...8.0138

##### *Ocean Currents*

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

BEACH CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE ...8.0103

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY ...9.0050

STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION ...13.0010

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN ...15.0024

PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN ...15.0025

...8.0065  
NUMERICAL SIMULATION OF TSUNAMIS ...13.0020

THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS ...13.0025

SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN ...15.0024

EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC FACTORS INFLUENCING EROSION OF THE OREGON COAST ...15.0033

#### *Ocean Hydrodynamics*

KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA ...8.0024

STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072

NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES ...13.0016

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

#### *Ocean Mixing*

SEA-AIR INTERACTION LABORATORY OPERATIONS ...8.0065

#### *Sea Level Variations*

NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO ...8.0138

##### *Storm Surge*

BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014

FLOOD INSURANCE STUDY ...6.0005

FLOOD INSURANCE STUDY ...6.0006

THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE ...8.0007

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

ESTUARINE HYDROLOGY OF TAMPA BAY ...8.0027

GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION ...8.0040

WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION ...8.0041

USE OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045

GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...8.0047

EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL ...8.0048

USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST ...8.0049

PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS ...8.0059

HURRICANE SURGE RESEARCH ...8.0060

ANALYTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (ABBREV) ...8.0070

HURRICANE SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072

HURRICANE CAMILLE - AUGUST 1969 ...8.0074

HURRICANE SURGE DAMAGE DUE TO HURRICANE CAMILLE ...8.0078

TROPICAL STORMFURY ANNUAL REPORT 1971 ...8.0095

HURRICANE WAVES HIT HAWAII ...8.0097

CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE ...8.0103

HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY) ...8.0107

TROPICAL STORM SURGE FORECASTING ...8.0109

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS ...8.0110

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND PREVALENT STORM CONDITIONS ...8.0111

PROBABILITY METHOD OF TIDE FREQUENCY ANALYSIS APPLIED TO ATLANTIC CITY AND LONG BEACH ISLAND, NEW JERSEY ...8.0112

ENVIRONMENTAL PREDICTION ...8.0113

SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS ...8.0114

CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972 ...8.0115

CASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES ...8.0116

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

ANALYTICAL PHYSICAL MODEL ...8.0126

SITKA AREA, ALASKA ...13.0018  
LONG-PERIOD WAVES AND SURGES ...13.0019

## Tides

FLOOD INSURANCE STUDY ...6.0006

PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119

PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS ...6.0152

THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE ...8.0007

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969 ...8.0014

GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0038

GALVESTON BAY HURRICANE SURGE - REPORT 3. EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION ...8.0040

GALVESTON BAY HURRICANE SURGE - REPORT 1. EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045

GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072

HURRICANE CAMILLE - AUGUST 1969 ...8.0074

TROPICAL STORM SURGE FORECASTING ...8.0109

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS ...8.0110

JOINT PROBABILITY METHOD OF TIDE FREQUENCY ANALYSIS APPLIED TO ATLANTIC CITY AND LONG BEACH ISLAND, NEW JERSEY ...8.0112

SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS ...8.0114

MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972 ...8.0115

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123

ANALYTICAL PHYSICAL MODEL ...8.0126

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY ...9.0050

FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA ...13.0001

WAVE REPORTING PROCEDURES FOR TIDE OBSERVERS IN THE TSUNAMI WARNING SYSTEM ...13.0007

TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA ...13.0011

RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018

LONG-PERIOD WAVES AND SURGES ...13.0019

RELATIVE SPECTRA OF TSUNAMIS ...13.0022

RECENT TSUNAMI THEORY ...13.0023

THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS ...13.0025

OFFSET COASTAL INLETS - FORMS OF SEDIMENT ACCUMULATION IN THE BEACH ZONE - ALASKA, NEW ENGLAND ...15.0022

PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET ...15.0035

### *Tsunamis*

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...1.0003

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...3.0011

SANTA CRUZ COUNTY COOP ...3.0106

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...3.0175

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

LONG-PERIOD WAVES AND SURGES ...8.0073

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...9.0031

GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS ...10.0002

FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA ...13.0001

TSUNAMI RESEARCH ...13.0004

TSUNAMI RESEARCH ...13.0005

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V ...13.0006

WAVE REPORTING PROCEDURES FOR TIDE OBSERVERS IN THE TSUNAMI WARNING SYSTEM ...13.0007

TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION ...13.0008

STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION ...13.0009

STEADY-FLOW STABILITY TESTS OF NAVIGATION

TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA ...13.0011

EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA ...13.0012

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA ...13.0014

TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS ...13.0015

NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES ...13.0016

RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018

NUMERICAL SIMULATION OF TSUNAMIS ...13.0020

PACIFIC TSUNAMI CATALOG ...13.0021

RELATIVE SPECTRA OF TSUNAMIS ...13.0022

RECENT TSUNAMI THEORY ...13.0023

TSUNAMI SHORELINE TRACT ...13.0024

THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS ...13.0025

THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL ...13.0026

A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL ...13.0027

TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY ...13.0028

THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING DEPTH - OFF-SHORE BEHAVIOR ...13.0029

### *Turbulence*

PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO ...8.0051

### *Waves*

PUGET PEAK AVALANCHE, ALASKA ...1.0007

BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014

DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116

SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969 ...8.0014

WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION ...8.0042

THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST ...8.0049

PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO ...8.0051

BREVEY ...8.0070  
 GIANT WAVES HIT HAWAII ...8.0097  
 USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
 DISTURBANCES ...8.0098  
 BEACH CHANGES BY EXTRAORDINARY WAVES  
 CAUSED BY HURRICANE CAMILLE ...8.0103  
 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES  
 FROM HURRICANES - I. LANDFALL STORMS ...8.0110  
 JOINT PROBABILITY METHOD OF TIDE FREQUENCY  
 ANALYSIS APPLIED TO ATLANTIC CITY AND LONG  
 BEACH ISLAND, NEW JERSEY ...8.0112  
 MARINE ENVIRONMENTAL PREDICTION ...8.0113  
 SUMMARY OF SELECTED REFERENCE MATERIAL ON  
 THE OCEANOGRAPHIC PHENOMENA OF TIDES,  
 STORM SURGES, WAVES, AND BREAKERS ...8.0114  
 MARINE CONDITIONS AND AUTOMATED FORECASTS  
 FOR THE ATLANTIC COASTAL STORM OF FEBRUARY  
 18-20, 1972 ...8.0115  
 JAMAICA BAY HURRICANE BARRIER STUDY NEW  
 YORK ...8.0119  
 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COM-  
 BINATIONS OF ASTRONOMICAL TIDES AND TSU-  
 NAMIS RECORDED AT CRESCENT CITY, CALIFORNIA  
 ...13.0001  
 TSUNAMI RESEARCH ...13.0005  
 WAVE REPORTING PROCEDURES FOR TIDE OBSER-  
 VERS IN THE TSUNAMI WARNING SYSTEM ...13.0007  
 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER  
 HILO HARBOR, HAWAII. HYDRAULIC MODEL IN-  
 VESTIGATION ...13.0009  
 EVALUATION OF LONG PERIOD SURFACE WAVES IN  
 THE GULF OF ALASKA ...13.0012  
 NAVY ENVIRONMENT - INVESTIGATIONS OF GENERA-  
 TION OF OCEAN WAVES AND OF RESONANT  
 RESPONSE OF HARBORS TO TSUNAMIS AND OTHER  
 LONG WAVES ...13.0016  
 NUMERICAL SIMULATION OF TSUNAMIS ...13.0020  
 RELATIVE SPECTRA OF TSUNAMIS ...13.0022  
 RECENT TSUNAMI THEORY ...13.0023  
 TSUNAMI SHORELINE TRACT ...13.0024  
 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS  
 ...13.0025  
 THEORETICS IN DESIGN OF THE PROPOSED CRESCENT  
 CITY HARBOR TSUNAMI MODEL ...13.0026  
 TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COM-  
 MUNITIES - TYPE 16 FLOOD INSURANCE STUDY  
 ...13.0028  
 KENNEDY SPACE CENTER OCEAN BEACH EROSION -  
 FLORIDA ...15.0005  
 COASTAL WORKS EVALUATION - CALIFORNIA,  
 FLORIDA ...15.0015  
 COASTAL ENGINEERING STUDIES RELATED TO  
 FLORIDA'S SHORELINE AND BEACH EROSION  
 PROBLEMS ...15.0016

PROFILE OF A STORM - WIND, WAVES AND FROST  
 ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN  
 ...15.0025  
 EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC  
 FACTORS INFLUENCING EROSION OF THE OREGON  
 COAST ...15.0033

## SEA WATER PROPERTIES

### Depth

JAMAICA BAY HURRICANE BARRIER STUDY NEW  
 YORK ...8.0119

### Thermal Properties

HURRICANE-OCEAN INTERACTION ...8.0064  
 SEA-AIR INTERACTION LABORATORY OPERATIONS  
 ...8.0065  
 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERA-  
 TURES (SST) ...8.0087  
 PROJECT STORMFURY ANNUAL REPORT 1971 ...8.0095  
 JAMAICA BAY HURRICANE BARRIER STUDY NEW  
 YORK ...8.0119  
 ANALYTICAL PHYSICAL MODEL ...8.0126  
 OBJECTIVE ANALYSIS OF THE SEA SURFACE TEM-  
 PERATURE ...8.0129

## Offshore Oil

*See Oceanography*

### Oil

*See Economic Geology*  
*Non-metallic Deposits*

## Oil and Natural Gas Reservoirs

*See Economic Geology*

## Open Channel Flow

*See Hydraulics*  
*Flow Types - Natural Water*

## Optical Instrumentation

*See Techniques and Instrumentation*

## Optimization and Feasibility

*e Economics*  
*Production and Processing*

## Optimization Technique

*e Information Systems Research*  
*Economic Theory*

## Organic

*e Water Quality*  
*Water Properties*

## Organic Compounds

*e Air Pollution*  
*Types of Pollutants*

## Organization Studies

*e Social Sciences*

## Orographic Effects

*e Meteorology*  
*Wind*

## Outfalls

*e Fluid Dynamics*  
*e Hydraulics*

## Outlets

*e Hydraulics*

## Outpatient Clinic

*e Hospital & Medical Facilities*  
*Hospital Services & Units*

## Overburden

*See Sedimentology*  
*Sedimentary Deposits*

## Paleontology

SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...**3.0182**

## FOSSIL ORGANISMS

### *Fossil Invertebrates*

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
...**15.0023**

### *Fossil Plants*

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
...**15.0023**

### *Fossil Vertebrates*

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
...**15.0023**

## Panels

*See Mechanics of Structures*

## Paramedical Personnel

*See Occupations, Populations*

## Parking

*See Transportation Engineering*  
*Terminals*

## Parks

*See Recreation*

## Particle - Gas Transfer

*See Oceanography*  
*Air - Sea Boundary Studies*

**Passenger**

*ransportation Engineering*  
*ervices*

**Peak Flow**

*ydraulics*  
*low Types - Natural Water*

**Penetrometer**

*oil Science and Mechanics*  
*techniques and Instrumentation*

**Periodic**

*ngineering Mechanics*  
*orces and Loadings*

**Periodicals, Journals**

*ublications*

**Permafrost - Frozen Soils**

*oil Science and Mechanics*  
*oil Types*

**Permeability**

*edimentology*  
*ediment Properties*  
*oil Science and Mechanics*  
*hysical Properties*  
*techniques and Instrumentation*

**Personnel**

*ublic Health*  
*ommunity Health Services*

**Pesticide Application**

*techniques and Instrumentation*

**Petrography**

*See Techniques and Instrumentation*

**Petroleum Wastes**

*See Water Quality*  
*Pollution Sources*

**Petroleum Wastes - Spillage**

*See Oceanography*  
*Marine Pollution*

**Photographic Instruments**

*See Techniques and Instrumentation*  
*Optical Instrumentation*

**Photography**

*See Meteorology*  
*Techniques and Instrumentation*

**Physical Climatology**

*See Meteorology*  
*Climatology*

**Physical Models**

*See Techniques and Instrumentation*  
*Model Studies*

**Physical Properties**

*See Soil Science and Mechanics*

**Physicians**

*See Occupations, Populations*

*See Stratigraphy*  
*Geologic History*

## **Physiography**

*See Geomorphology*

## **Physiology, Plant Chemistry**

*See Forestry*  
*Silviculture*

## **Piezometers**

*See Soil Science and Mechanics*  
*Techniques and Instrumentation*

## **Piezometry**

*See Techniques and Instrumentation*

## **Pillow Lava**

*See Volcanics*

## **Pipelines**

*See Transportation Engineering*  
*Transportation Systems*

## **Piping Systems**

*See Buildings & Land Development*  
*Components and Equipment*

## **Plane Table Surveying**

*See Techniques and Instrumentation*  
*Surveying Methods*

## **Planning**

*See Buildings & Land Development*  
*Land Use and Development*  
*Water Resources Management*

*See Water Quality*  
*Pollution Sources*

## **Plastic**

*See Engineering Mechanics*  
*Analysis*  
*Strain*

## **Plate or Block Tectonics**

*See Structural Geology*  
*Tectonics*

## **Plates**

*See Mechanics of Structures*

## **Platforms**

*See Oceanography*  
*Oceanographic Instrumentation*

## **Plumes**

*See Fluid Dynamics*

## **Police**

*See Occupations, Populations*

## **Policy Making**

*See Social Sciences*  
*Government*

## **Pollutant Identification**

*See Water Quality*

## **Pollution Abatement**

*See Water Quality*  
*Water Quality Control*

*See Water Quality*

## **Pollution Sources**

*See Water Quality*

## **Population Distribution**

*See Ecology*

## **Population Dynamics**

*See Ecology*

## **Pore Water**

*See Soil Science and Mechanics  
Pressure*

## **Porosity**

*See Sedimentology  
Sediment Properties*

## **Ports & Harbors**

*See Transportation Engineering  
Terminals*

## **Potable Water**

*See Water Quality*

## **Potential of Deposit**

*See Economic Geology  
Mineral Appraisals*

## **Power Plants**

*See Mechanical Power & Equipment*

## **Power Reservoirs**

*See Reservoirs and Impoundments*

TEYON DAM SEISMICITY - IDAHO ...3.0050

SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA  
AND TEXAS ...3.0125

MONITORING FLOOD DAMAGE WITH SATELLITE  
IMAGERY ...6.0030

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA  
...6.0033

BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

ALTERNATE SOLUTIONS TO WATER RESOURCE  
DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151

HOLLOW CREEK WATERSHED PROJECT, SOUTH  
CAROLINA ...6.0197

WHITewater CREEK HYDROLOGIC UNIT PROJECT  
MEASURE, CHEROKEE HILLS RC AND D PROJECT,  
OKLAHOMA ...6.0206

FORT SCOTT LAKE, MARMATON RIVER, KANSAS  
...6.0315

STREAMS AND DRAINAGE BASINS - FULTON COUNTY,  
NEW YORK ...6.0329

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

ENGINEERING GEOLOGY - ILLINOIS ...9.0011

## **Precipitation**

*See Meteorology  
Meteorological Precipitation*

## **Prediction Models**

*See Information Systems Research  
Mathematical Models*

## **Prefabricated Structures**

*See Mechanics of Structures*

## **Pressure**

*See Soil Science and Mechanics  
See Techniques and Instrumentation  
Measurements & Measuring*

## **Primary Waves**

*See Geophysics  
Seismology*

## **Production and Processing**

*See Economics*



## **Programming**

*See Information Systems Research  
Economic Theory*

### **Project Post-evaluation**

*See Water Resources Management*

### **Projections and Estimations**

*See Water Resources Management*

### **Projections and Forecasts**

*See Economics*

## **Public Health**

### **COMMUNITY HEALTH SERVICES**

#### *Administration & Planning*

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN CENTRAL REGION, COMMON-  
WEALTH OF PENNSYLVANIA ...6.0008

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN LUZERNE-WYOMING COUNTIES  
OF THE COMMONWEALTH OF PENNSYLVANIA  
...6.0009

TRAINING AND EVALUATION OF MENTAL HEALTH  
SERVICES TO RESIDENTS OF FLOOD DISASTER  
AREAS IN COMMONWEALTH OF PENNSYLVANIA  
...6.0010

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN LUZERNE-WYOMING COUNTIES,  
COMMONWEALTH OF PENNSYLVANIA ...6.0011

EMERGENCY OPERATIONS SYSTEMS DEVELOPMENT -  
CIVIL DEFENSE RESCUE PHASE II ...16.0001

CONSULTATIVE PSYCHIATRIC SERVICES TO IN-  
DIVIDUALS AND COMMUNITY GROUPS AND AGEN-  
CIES IN RAPID CITY, SOUTH DAKOTA ...16.0002

A SIMULATION MODEL FOR EMERGENCY MEDICAL  
SYSTEMS ...16.0006

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE  
OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I -  
OPERATION STRUCTURE AND PROCEDURES ...16.0013

SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY  
...16.0018

EVALUATION OF POLICY-RELATED RESEARCH IN THE  
FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND

EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS  
...16.0029

THE DEVELOPMENT OF A MEANS FOR ASSESSING  
EMERGENCY MEDICAL RESOURCES ...16.0052

#### *Community Mental Health Center*

TRAINING AND EVALUATION OF MENTAL HEALTH  
SERVICES TO RESIDENTS OF FLOOD DISASTER  
AREAS IN COMMONWEALTH OF PENNSYLVANIA  
...6.0010

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN LUZERNE-WYOMING COUNTIES,  
COMMONWEALTH OF PENNSYLVANIA ...6.0011

CONSULTATIVE PSYCHIATRIC SERVICES TO IN-  
DIVIDUALS AND COMMUNITY GROUPS AND AGEN-  
CIES IN RAPID CITY, SOUTH DAKOTA ...16.0002

#### *Emergency Non-hospital Service*

EMERGENCY OPERATIONS SYSTEMS DEVELOPMENT -  
CIVIL DEFENSE RESCUE PHASE II ...16.0001

DEVELOPMENT OF TRAINING PROGRAM FOR EMER-  
GENCY MEDICAL SERVICE PROGRAM ADMINISTRA-  
TION ...16.0003

A SIMULATION MODEL FOR EMERGENCY MEDICAL  
SYSTEMS ...16.0006

MILITARY BLOOD BANKING (CIVIL DISASTERS)  
...16.0007

PUBLIC HEALTH SERVICE DISASTER ASSISTANCE RE-  
PORT JULY 1967-JUNE 1970 ...16.0011

HELICOPTER AMBULANCE SERVICE TO EMERGENCIES  
...16.0012

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE  
OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I -  
OPERATION STRUCTURE AND PROCEDURES ...16.0013

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES -  
NEBRASKA (PROJECT 20/20) ...16.0014

ANALYSIS OF EMERGENCY MEDICAL SERVICES  
COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL  
SUBDIVISIONS ...16.0016

SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY  
...16.0018

EVALUATION OF POLICY-RELATED RESEARCH IN THE  
FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND  
SERVICES -- EMERGENCY MEDICAL SERVICES  
...16.0022

DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMER-  
GENCY MEDICAL CARE, IN THE METROPOLITAN  
NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023

THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL  
CARE SYSTEMS ...16.0024

A NATIONWIDE PROGRAM TO DEVELOP REGIONAL  
EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS  
...16.0029

THE DEVELOPMENT OF A MEANS FOR ASSESSING  
EMERGENCY MEDICAL RESOURCES ...16.0052

TRAINING AND EVALUATION OF MILITARY  
SERVICES TO RESIDENTS OF FLOOD DISASTER  
AREAS IN COMMONWEALTH OF PENNSYLVANIA  
6.0010

MILITARY BLOOD BANKING (CIVIL DISASTERS)  
16.0007

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES -  
NEBRASKA (PROJECT 20/20) ...16.0014

TRAINING PROGRAM FOR CRISIS INTERVENORS  
16.0020

#### *Regional Centers*

A NATIONWIDE PROGRAM TO DEVELOP REGIONAL  
EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS  
16.0029

#### *Epidemiology of Disease*

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

#### *Public Income Planning*

*See Economics*  
*Income Analysis*

#### *Public Service*

*See Buildings & Land Development*  
*Building Classification*

#### *Public Water Supply Reservoirs*

*See Reservoirs and Impoundments*

#### *Public Works*

*See Urban Research*

#### *Publications*

STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE  
STATISTICS, APPENDIX B ...3.0024

EARTHQUAKES AND INSURANCE - ERA CONFERENCE  
2-3 APRIL 1973 ...3.0140

DENVER EARTHQUAKES ...3.0217

CONTRACT FOR PARTIAL SUPPORT OF THE COMMIT-  
TEE ON FIRE RESEARCH ...5.0008

HYDROLOGIC ENGINEERING METHODS FOR WATER  
RESOURCES DEVELOPMENT - VOLUME I - REQUIRE-  
MENTS AND GENERAL PROCEDURES ...6.0037

FINAL REPORT OF THE  
THE EVENTS OF AGNES ...8.0022

SUMMARY OF SELECTED REFERENCE MATERIAL ON  
THE OCEANOGRAPHIC PHENOMENA OF TIDES,  
STORM SURGES, WAVES, AND BREAKERS ...8.0114

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...9.0041

DAILY TORNADO FREQUENCIES FOR THE CON-  
TIGUOUS UNITED STATES ...12.0037

NATIONAL ATMOSPHERIC SCIENCES PROGRAM -  
FISCAL YEAR 1974 ...16.0076

#### *BIBLIOGRAPHY*

AVALANCHE STUDIES, 1971-1972 ...1.0001

WATER RESOURCES OF MIDDLE GEORGIA ...6.0245

FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLAT-  
SOP AND TILLAMOOK COUNTIES, OREGON - 1972-  
1973 ...6.0352

A SURVEY OF AVAILABILITY OF HUR-  
RICANE/TYPHOON PACKAGES AND ASSOCIATED  
DATA ...8.0071

SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

#### *CATALOGS, TABLES, COMPILATIONS*

APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA ...6.0351

HURRICANE CELIA REDEVELOPMENT ...8.0015

A SURVEY OF AVAILABILITY OF HUR-  
RICANE/TYPHOON PACKAGES AND ASSOCIATED  
DATA ...8.0071

TORNADOES IN TENNESSEE (1916-1970) WITH  
REFERENCE TO NOTABLE TORNADO DISASTER IN  
THE UNITED STATES (1880-1970) ...12.0009

PACIFIC TSUNAMI CATALOG ...13.0021

EVALUATION OF POLICY-RELATED RESEARCH IN THE  
FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND  
SERVICES -- EMERGENCY MEDICAL SERVICES  
...16.0022

FIELD STUDIES OF DISASTER BEHAVIOR - AN INVEN-  
TORY ...16.0064

#### *HANDBOOKS*

NORTH CASCADES HIGHWAY SR-20 AVALANCHE  
ATLAS ...1.0002

SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS  
UNITED STATES ...3.0164

SEISMIC DESIGN FOR BUILDINGS ...3.0187

EARTHQUAKE RESISTANT DESIGN REQUIREMENTS  
FOR VA HOSPITAL FACILITIES ...3.0201

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

EFFECT OF URBANIZATION ON HYDROLOGY OF  
WATERSHEDS - INDIANA ...6.0270

GOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS  
IOWA ...6.0278

EVALUATION OF HURRICANE AGNES FLOODS IN  
COMPARISON TO BRIDGE DESIGN INFORMATION  
AVAILABLE FOR PENNSYLVANIA CONTEMPORANE-  
OUSLY ...6.0355

SNOW AND ICE DETECTION AND WARNING SYSTEMS  
11.0002

TERMINATION OF SNOW FENCE DESIGN CRITERIA,  
AND DEVELOPMENT OF A HANDBOOK FOR SNOW  
CONTROL ...11.0008

## INDEXES

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPER-  
TIES OF FUELS RELATED TO FIRE PHENOMENA  
5.0018

NATIONAL FIRE DANGER RATING ...5.0027

BEST FIRE METEOROLOGY IN THE PACIFIC  
COASTAL REGION ...5.0040

## MONOGRAPHS

DEPENDENT AM AND FM BROADCAST ANTENNAS  
16.0107

## PERIODICALS, JOURNALS

BAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS  
6.0389

## Pulp, Paper, and Logging

EFFECTS OF DEFORESTATION ON THE STABILITY OF  
NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

SION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA-  
BLE SOILS IN THREE SMALL WESTERN OREGON  
WATERSHEDS ...15.0034

## Pumping

*Techniques and Instrumentation*

## Pumps

*Mechanical Power & Equipment*

## Quality Control

*See Transportation Engineering*

## Radar

*See Meteorology*  
*Techniques and Instrumentation*  
*See Techniques and Instrumentation*  
*Remote Sensing*

## Radiation Emission

*See Soil Science and Mechanics*  
*Physical Properties*

## Radio Communication

*See Electronic Systems*  
*Communication Systems*

## Radio Detection Systems

*See Electronic Systems*  
*Sensing Systems*

## Radioactive Fallout

*See Water Quality*  
*Pollution Sources*

## Radioactive Waste

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

## Radioactivity

*See Air Pollution*  
*Types of Pollutants*

## Radiosondes - Rawinsondes

*See Meteorology*  
*Techniques and Instrumentation*

## Rain Gages

*See Meteorology  
Techniques and Instrumentation*

## Random

*See Engineering Mechanics  
Forces and Loadings*

## Rate of Deposition

*See Sedimentology  
Sedimentary Deposits*

## Reactor Safety

*See Nuclear Reactors*

## Reactor Siting

*See Nuclear Reactors*

## Real Estate Sector

*See Economics*

## Reconnaissance Maps

*See Techniques and Instrumentation  
Maps and Surveys*

## Reconnaissance Surveying

*See Techniques and Instrumentation  
Surveying Methods*

BIG TREE LAKE, MISSISSIPPI  
MACADOO ROAD-FILL DAM, KANSAS ...6.0203  
A PROGRAM FOR METROPOLITAN WATER MANAGE-  
MENT ...6.0243

THE USE OF DETAILED SOILS INFORMATION FOR  
DELINEATING AND REGULATING FLOOD PLAINS -  
LEGAL AND ADMINISTRATIVE CONSIDERATIONS  
...6.0413

COASTAL STORM DAMAGE WITH SPECIAL REFERENCE  
TO THE DELMARVA REGION OF DELAWARE, MARY-  
LAND, VIRGINIA ...8.0002

REGULATION OF GREAT LAKES WATER LEVELS - A  
SUMMARY REPORT/1974 ...16.0040

## ACCESS TO RECREATION

NORTH RICHMOND - SAN PABLO BAY AREA STUDY -  
CALIFORNIA ...6.0178

## DAMAGE LOSSES

LAKE SHORE EROSION IN ILLINOIS ...15.0020

## DEMAND AND USE

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL  
FLOOD CONTROL ON THE IOWA RIVER, IOWA  
...6.0273

DETERMINATION OF DECISION MAKING PROCESSES IN  
WATER RESOURCE PLANNING AND DEVELOPMENT -  
THE CONNECTICUT RIVER BASIN ...6.0292

## LAWS AND REGULATIONS

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

## PARKS

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
AURORA, N.Y. ...6.0332

## RECREATION ACTIVITIES

### Bicycling

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

### Boating

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182  
A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
ILLINOIS ...6.0260

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154  
HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

#### *Hiking*

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154

#### *Touring*

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

#### RECREATION FACILITIES

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...3.0185

MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA ...6.0027

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA ...6.0033

ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA ...6.0035

DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116

BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151

PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV) ...6.0175

NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA ...6.0178

GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179

SOCIALLY DEFINED ENVIRONMENTAL VALUES IN URBAN WATER RESOURCES PLANNING ...6.0191

BIG CREEK WATERSHED, KANSAS ...6.0202

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260

WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION ...6.0271

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351

SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR ...6.0360

DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367

WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379

FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

HAMILTON 2 DEGREE ...9.0048

BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA ...15.0006

JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION ...15.0007

#### SAFETY

CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON ...14.0007

#### Recreational

*See Buildings & Land Development  
Building Classification*

#### Regional Centers

*See Public Health  
Community Health Services*

#### Regional Economics

*See Economics*

#### Regional Systems

*See Waste Water Treatment/Disposal  
Sewage System*

## Rehabilitation

DELIVERING VOCATIONAL REHABILITATION SERVICES  
IN A DISASTER AREA ...6.0014

## Reinforced

*See Mechanics of Structures*  
*Concrete Structures*

## Relief

*See Geomorphology*  
*Watershed Morphology*

## Religion

*See Social Sciences*

## Remote Control Systems

*See Electronic Systems*

## Remote Sensing

*See Techniques and Instrumentation*

## Remote Sensing Systems

*See Electronic Systems*  
*Sensing Systems*

## Repairs, Maintenance

RATE OF LOADING EFFECTS ON UNCRACKED AND  
REPAIRED REINFORCED CONCRETE MEMBERS  
...3.0084

INELASTIC RESPONSE OF BUILDINGS AND STRUC-  
TURAL RESTORATION ...3.0190

## Rescue Operations

*See Aeronautics and Aerodynamics*

## Reservoirs

*See Soil Science and Mechanics*

EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLU-  
DING RESERVOIR INTERACTION ...3.0029

EARTHQUAKE RESPONSE OF CONCRETE GRAVITY  
DAMS ...3.0031

EARTHQUAKES RELATED TO RESERVOIR FILLING  
...3.0054

STRUCTURAL MODEL TESTS OF EARTHQUAKE E-  
FFECTS (ES 047) ...3.0065

EVALUATION OF THE INCREMENTAL SEISMIC RISK  
DUE TO RESERVOIR FILLING ...3.0142

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES  
IN EARTH DAMS ...3.0231

LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON  
...3.0267

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062

INITIAL RESULTS FROM THE UPPER WABASH SIMUL A-  
TION MODEL ...6.0088

FLOOD WAVES FROM A CONTROLLED BREACH IN  
DAM ...6.0124

FLOOD HYDROLOGY INVESTIGATIONS ...6.0183

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

MACADOO ROAD-FILL DAM, KANSAS ...6.0203

DEVELOPMENT OF WATER RESOURCE MANAGEMENT  
METHODS - TENNESSEE ...6.0367

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS  
WATERSHEDS ...6.0375

VARIATION OF URBAN RUNOFF WITH DURATION AND  
INTENSITY OF STORMS - TEXAS ...6.0387

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

VOLCANIC HAZARDS IN THE CASCADE RANGE -  
CALIFORNIA AND WASHINGTON ...14.0007

## FLOOD CONTROL RESERVOIRS

FACTORS AFFECTING RELOCATION IN RESPONSE TO  
RESERVOIR DEVELOPMENT ...6.0004

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA  
...6.0033

HYDROLOGIC ENGINEERING METHODS FOR WATER  
RESOURCES DEVELOPMENT - VOLUME I - REQUIRE-  
MENTS AND GENERAL PROCEDURES ...6.0037

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL  
...6.0038

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMEN-  
TAL RESEARCH PROGRAM - ILLINOIS ...6.0086

PLANT SPECIES AS WILDLIFE COVER AND EROSION  
CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESER-  
VOIR SYSTEMS ...6.0089

WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM ...6.0131

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151

FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276

MISSISSIPPI BASIN MODEL ...6.0313

FORT SCOTT LAKE, MARMATON RIVER, KANSAS ...6.0315

STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR ...6.0360

RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS ...6.0388

FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALIY RIVER, WASHINGTON ...6.0403

FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON ...6.0404

#### IRRIGATION RESERVOIRS

DEVELOPMENT OF AN OPERATIONS MODEL FOR MONTANA'S WATER RESOURCES, MIDDLE CREEK RESERVOIR OPERATION ...6.0126

#### MULTIPLE PURPOSE RESERVOIRS

FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT ...6.0004

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA ...6.0033

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

...6.0271

FORT SCOTT LAKE, MARMATON RIVER, KANSAS ...6.0315

STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

#### POWER RESERVOIRS

GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO ...3.0166

#### PUBLIC WATER SUPPLY RESERVOIRS

SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS ...3.0125

FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141

BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257

FORT SCOTT LAKE, MARMATON RIVER, KANSAS ...6.0315

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396

FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON ...6.0404

#### Residential

*See Buildings & Land Development  
Building Classification*

#### Resource Inventories

*See Economic Geology  
Mineral Appraisals*

#### Response

*See Engineering Mechanics  
Mechanical Vibrations*

*See Economics*

## **Retaining Walls**

*See Soil Science and Mechanics  
Earth Structures*

## **Retardants**

*See Fire Research  
Fire Control*

## **Revetments**

*See Hydraulics*

## **Rhyolite**

*See Igneous Rocks*

## **Rifts**

*See Structural Geology  
Faults*

## **Rime**

*See Meteorology  
Meteorological Condensation*

## **Riparian Land**

DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288

## **Riprap**

*See Hydraulics*

## **Risk & Entrepreneur Decisions**

*See Economics  
Production and Processing*

## **River Basins**

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017

AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMEE RIVER BASIN - FLORIDA ...6.0066

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS ...6.0086

FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN ...6.0105

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130

TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN ...6.0143

RUNOFF SIMULATION ...6.0156

CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS ...6.0171

SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS ...6.0173

SMALL STREAM FLOOD CHARACTERISTICS ...6.0193

FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215

NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL REPORT, FISCAL YEAR 1971 ...6.0227

OHIO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U. S. WATER RESOURCES COUNCIL (AB BREV) ...6.0228

HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION ...6.0271

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281

PROBABLE MAXIMUM PRECIPITATION AND SNOW MELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA ...6.0290

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291

DETERMINATION OF DECISION MAKING PROCESSES IN WATER RESOURCE PLANNING AND DEVELOPMENT - THE CONNECTICUT RIVER BASIN ...6.0292

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN ...6.0337

FLOOD PLAIN INUNDATION ...6.0364



PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380

STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I ...10.0025

REMOTE SENSING, ALAFIA AND PEACE RIVER BASINS, FLORIDA ...10.0029

## Road Obstacles

*See Transportation Engineering*  
*Traffic Engineering*

## Roadway

*See Transportation Engineering*

## Rock Mechanics

*See Structural Geology*

## Rockfill Dams

*See Hydraulics*  
*Dams*

## Roofs

*See Buildings & Land Development*  
*Components and Equipment*

## Rural Areas

NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE ...2.0016

DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS ...5.0042

FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT ...6.0004

URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076

STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV) ...6.0092

RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA ...6.0208

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS ...6.0375

DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020

EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES ...16.0022

## Safety

*See Buildings & Land Development*  
*See Recreation*  
*See Transportation Engineering*  
*Traffic Engineering*

## Safety Engineering

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0017

## Saline Water Intrusion

*See Water Quality*  
*Pollution Sources*

## Salinity

*See Oceanography*  
*Sea Water Chemistry*  
*See Water Quality*  
*Water Properties*

## Salt

*See Economic Geology*  
*Non-metallic Deposits*

*See Structural Geology*  
*Tectonic Features*

*See Geomorphology*  
*Shoreline Geomorphology*

## **Salt Marshes**

## **Sea Floor Spreading**

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY -  
HURRICANE PROTECTION PROJECT ...6.0098

*See Structural Geology*  
*Tectonics*

## **Sampling**

## **Sea Level Variations**

*See Techniques and Instrumentation*

*See Oceanography*  
*Sea Water Motion*

## **Sand**

## **Sea Walls**

*See Soil Science and Mechanics*  
*Soil Types*

*See Hydraulics*

## **Sands and Gravels**

## **Sea Water Analysis**

*See Economic Geology*  
*Non-metallic Deposits*

*See Oceanography*  
*Sea Water Chemistry*

## **Sanitary Landfills**

## **Sea Water Motion**

*See Water Quality*  
*Pollution Sources*

*See Oceanography*

## **Satellite Communication**

## **Seasonal Discharge**

*See Electronic Systems*  
*Communication Systems*

*See Hydraulics*  
*Discharge*

## **Satellites**

## **Seasonal Studies**

*See Meteorology*  
*Techniques and Instrumentation*  
*See Techniques and Instrumentation*  
*Remote Sensing*

*See Meteorology*

## **Sediment Deposition**

*See Sedimentology*

## **Saturated**

## **Sediment Properties**

*See Soil Science and Mechanics*  
*Soil Types*

*See Sedimentology*

## **Scarps**

## **Sedimentary History**

*See Structural Geology*

*See Stratigraphy*

## DIAGENESIS

TEXAS BARRIER ISLANDS ...15.0037

## LITHIFICATION

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...3.0067

EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION ...3.0260

## SEDIMENT DEPOSITION

COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA ...15.0015

ENVIRONMENTAL GEOMORPHIC STUDY OF THE COASTAL REGIMES ALONG THE SOUTH SHORE OF LONG ISLAND - NEW YORK ...15.0027

## SEDIMENT PROPERTIES

### *Interstitial Water*

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

### *Mineralogical Composition*

A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023

### *Permeability*

BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014

EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION ...3.0260

RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R ...10.0018

### *Porosity*

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...3.0067

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015

INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS ...8.0128

ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI ...9.0053

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...10.0010

DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...15.0029

## SEDIMENT PROVENANCE STUDIES

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA ...6.0137

SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA ...15.0039

## SEDIMENT TRANSPORT

VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205

### *Transport Agents*

SAN FRANCISCO BAY ...15.0013

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

### *Transport Effects*

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212

COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS ...15.0016

### *Transport Methods*

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085

PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168

URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212

GY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA ...8.0133  
 SAN FRANCISCO BAY ...15.0013  
 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS ...15.0018  
 SHORE EROSION STUDY OF LAKE COUNTY, OHIO ...15.0031

#### SEDIMENTARY DEPOSITS

GREATER ANCHORAGE AREA BOROUGH, ALASKA ...3.0172  
 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076  
 USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA ...6.0137  
 MACADOO ROAD-FILL DAM, KANSAS ...6.0203  
 EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...6.0341  
 REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY ...9.0050

#### *Alluvial Deposits*

REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124  
 SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019  
 GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032  
 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO ...14.0012  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### *Lake Deposits*

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043  
 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO ...9.0061

#### *Loess*

DENVER URBAN CORRIDOR STUDIES - COLORADO ...4.0005

#### *Overburden*

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...6.0185  
 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R ...10.0018

#### *Rate of Deposition*

SAN FRANCISCO BAY ...15.0013

REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124  
 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...6.0185  
 MONTEREY BAY - CALIFORNIA ...9.0030  
 LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011

#### *Unconsolidated Deposits*

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...13.0017  
 SAN FRANCISCO BAY ...15.0013  
 ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT ...15.0038  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### SEDIMENTARY ROCKS

TEXAS BARRIER ISLANDS ...15.0037

#### *Glacial Clastics*

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

#### *Non-clastic Sediments*

GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032  
 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO ...14.0012

#### *Tectogenic Clastics*

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128  
 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243  
 GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032

#### *Water Deposited Clastics*

BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014  
 STABILIZATION OF EXPANSIVE CLAYS AND SHALES ...4.0007  
 CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA ...9.0017  
 ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021  
 LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

...LOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

*See Geophysics  
Seismology*

...ASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

...AKE RIVER PLAIN, PART E - NORTH CENTRAL -  
...DAHO ...14.0012

## Seismic Motion

## Sediments

*See Geophysics  
Seismology*

...Water Quality  
...Pollution Sources

## Seismic Reflection

## Seepage

*See Geophysics  
Seismology*

...Also Soil Science and Mechanics

...OPTIMUM WATER ALLOCATION MODEL BASED ON  
...AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN -  
...FLORIDA ...6.0066

## Seismic Stations and Networks

*See Geophysics  
Seismology*

...HYDROLOGIC CONDITIONS AND FLOOD POTEN-  
...TIALS IN THE SINK AREAS OF SOUTH WESTERN  
...EMINOLE COUNTY, FLORIDA ...6.0230

...Y OF JACKSON, MISSISSIPPI, WATER RESOURCES  
...TUDY ...6.0310

## Seismic Strain

...Y OF JACKSON WATER RESOURCES STUDY ...6.0311  
...E EFFECT OF GROUND-WATER CONDITIONS ON  
...LOCAL FLOODING IN THE KINGSTON AREA,  
...PENNSYLVANIA ...6.0357

*See Geophysics  
Seismology*

...LANDSLIDES - KENTUCKY ...9.0015

## Seismic Stress

...MOTTE SENSING, ALFAFIA AND PEACE RIVER  
...BASINS, FLORIDA ...10.0029

*See Geophysics  
Seismology*

## Seiches

...GET PEAK AVALANCHE, ALASKA ...1.0007

## Seismic Studies

...GENERAL REVIEW OF THE SEISMIC HAZARD TO  
...SELECTED U.S. NAVY INSTALLATIONS ...3.0044

*See Oceanography  
Geophysical Oceanography*

...ASKA GEOLOGIC EARTHQUAKE HAZARDS ...3.0122

## Seismic Applications

## Seismic Surveys

*Geophysics  
Seismology*

*See Geophysics  
Seismology*

## Seismic Energy

## Seismic Tiltmeters

*Geophysics  
Seismology*

*See Geophysics  
Geophysical Instrumentation*

## Seismic Mapping

## Seismic Travel Time

*Geophysics  
Seismology*

*See Geophysics  
Seismology*

SEDIMENT MOVEMENT AND MECHANISMS OF EROSION  
 IN THE CENTRAL APPALACHIAN REGION - VIR-  
 GINIA ...8.0133  
 SAN FRANCISCO BAY ...15.0013  
 DEPOSITION OF HAWAIIAN WATERSHED AND  
 ESTUARINE SEDIMENTS ...15.0018  
 SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
 ...15.0031

#### SEDIMENTARY DEPOSITS

GREATER ANCHORAGE AREA BOROUGH, ALASKA  
 ...3.0172  
 URBAN HYDROLOGY AND URBAN WATER RESOURCES  
 OF THE ISLAND OF OAHU, HAWAII ...6.0076  
 USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
 RESOURCE PLANNING AND MANAGEMENT IN  
 NORTH CAROLINA ...6.0137  
 MACADOO ROAD-FILL DAM, KANSAS ...6.0203  
 EROSION AND DEPOSITION IN THE SOUNDS AND  
 ESTUARIES OF THE NORTH CAROLINA COAST  
 ...6.0341  
 REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
 GEOLOGY ...9.0050

#### Alluvial Deposits

REGIONAL AND DETAILED GRAVITY STUDIES IN TEC-  
 TONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124  
 SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL  
 SOILS ...9.0019  
 GEOLOGY OF THE POINT BONITA QUADRANGLE,  
 CALIFORNIA ...9.0032  
 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
 IDAHO ...14.0012  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### Lake Deposits

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
 URBAN AREA, ALASKA ...9.0043  
 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
 MODELS - OHIO ...9.0061

#### Loess

DENVER URBAN CORRIDOR STUDIES - COLORADO  
 ...4.0005

#### Overburden

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
 ...6.0185  
 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
 STUDY THE EXTENT, MAGNITUDE R ...10.0018

#### Rate of Deposition

SAN FRANCISCO BAY ...15.0013

REGIONAL AND DETAILED GRAVITY STUDIES IN TEC-  
 TONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124  
 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
 ...6.0185  
 MONTEREY BAY - CALIFORNIA ...9.0030  
 LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
 ...10.0011

#### Unconsolidated Deposits

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
 OF COASTAL COMMUNITIES, ALASKA ...13.0017  
 SAN FRANCISCO BAY ...15.0013  
 ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
 NORTHWESTERN VERMONT ...15.0038  
 SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### SEDIMENTARY ROCKS

TEXAS BARRIER ISLANDS ...15.0037

#### Glacial Clastics

WATER RESOURCES OF THE RED RIVER OF THE  
 NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

#### Non-clastic Sediments

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
 CALIFORNIA ...9.0032  
 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
 IDAHO ...14.0012

#### Tectogenic Clastics

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST  
 AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
 PENINSULA, WASHINGTON ...3.0128  
 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
 CURRENCE OF FRESH GROUND WATER IN POST-  
 OLIGOCENE DEPOSITS OF THE GULF COASTAL  
 PLAIN ...3.0243  
 GEOLOGY OF THE POINT BONITA QUADRANGLE,  
 CALIFORNIA ...9.0032

#### Water Deposited Clastics

BEACHES AND GROUND WATER OF CAPE SABLE,  
 FLORIDA, DURING EXTREME DROUGHT ...2.0014  
 STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
 ...4.0007  
 CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GOR-  
 MAN, CALIFORNIA ...9.0017  
 ROCK STRENGTH FROM FAILURE CASES - POWER-  
 HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
 MONTANA ...9.0021  
 LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
 NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
 POTENTIAL IN THE PIERRE SHALE ...9.0022

Y OF THE POINT BONITA QUADRANGLE,  
ORNIA ...9.0032  
PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
15  
RIVER PLAIN, PART E - NORTH CENTRAL -  
...14.0012

*See Geophysics  
Seismology*

## Sediments

r Quality  
tion Sources

*See Geophysics  
Seismology*

## Seismic Motion

## Seepage

*See Geophysics  
Seismology*

## Seismic Reflection

Soft Science and Mechanics

## Seismic Stations and Networks

MUM WATER ALLOCATION MODEL BASED ON  
ANALYSIS FOR THE KISSIMMEE RIVER BASIN -  
DA ...6.0066

*See Geophysics  
Seismology*

ROLOGIC CONDITIONS AND FLOOD POTEN-  
IN THE SINK AREAS OF SOUTH WESTERN  
OLE COUNTY, FLORIDA ...6.0230

## Seismic Strain

E JACKSON, MISSISSIPPI, WATER RESOURCES  
...6.0310

JACKSON WATER RESOURCES STUDY ...6.0311

*See Geophysics  
Seismology*

EFFECT OF GROUND-WATER CONDITIONS ON  
FLOODING IN THE KINGSTON AREA,  
YLVANIA ...6.0357

## Seismic Stress

IDES - KENTUCKY ...9.0015

SENSING, ALFAFIA AND PEACE RIVER  
S, FLORIDA ...10.0029

*See Geophysics  
Seismology*

## Selches

## Seismic Studies

BEAK AVALANCHE, ALASKA ...1.0007

L REVIEW OF THE SEISMIC HAZARD TO  
TED U.S. NAVY INSTALLATIONS ...3.0044

*See Oceanography  
Geophysical Oceanography*

GEOLOGIC EARTHQUAKE HAZARDS ...3.0122

## Seismic Surveys

## Seismic Applications

ysics  
ology

*See Geophysics  
Seismology*

## Seismic Energy

## Seismic Tiltmeters

ysics  
ology

*See Geophysics  
Geophysical Instrumentation*

## Seismic Mapping

## Seismic Travel Time

ysics

*See Geophysics*

*Geophysics*  
*Seismology*

**Septic Tanks**

**Seismic Wave Frequency**

*See Waste Water Treatment/Disposal*  
*Sewage System*

*Geophysics*  
*Seismology*

**Settlement**

**Seismic Wave Magnitude**

*See Soil Science and Mechanics*

*Geophysics*  
*Seismology*

**Severe Storms**

**Seismic Wave Propagation**

*See Meteorology*  
*Atmosphere Disturbance*

*Geophysics*  
*Seismology*

**Sewage**

**Seismic Wave Velocity**

*See Water Quality*  
*Pollution Sources*

*Geophysics*  
*Seismology*

**Sewage System**

**Seismographs**

*See Waste Water Treatment/Disposal*

*Geophysics*  
*Geophysical Instrumentation*

**Shale**

**Seismology**

*See Soil Science and Mechanics*  
*Soil Types*

*Geophysics*

**Shape**

**Seismometers**

*See Geomorphology*  
*Watershed Morphology*

*Geophysics*  
*Geophysical Instrumentation*

**Shear**

**Semi- Arid**

*See Engineering Mechanics*  
*Strain*

*Climates*

**Shear Strength**

**Sensing Systems**

*See Soil Science and Mechanics*  
*Mechanical Properties*  
*See Structural Geology*  
*Rock Mechanics*

*Electronic Systems*

**Sensitivity Techniques**

**Shells**

*Information Systems Research*



*Oceanography*  
*Oceanographic Techniques*

*See Economics*  
*See Techniques and Instrumentation*

## **Shoals**

## **Site Location Factors**

**KANSAS COAST HURRICANE SURGE MODEL STUDIES**  
**8.0013**

*See Economics*

**SHORELINE ENVIRONMENTAL PREDICTION ...8.0113**

## **Sites**

## **Shock Waves**

*See Buildings & Land Development*  
*Construction*

*Acoustics*

## **Shoreline Geomorphology**

## **Slabs**

*Geomorphology*

*See Mechanics of Structures*

## **Shoreline Structures**

## **Slope Stabilization**

*Oceanography*  
*Ocean Engineering Studies*

*See Techniques and Instrumentation*  
*Land Forming*

## **Short Range Forecasting**

## **Slopes**

*Futures Research*

*See Geomorphology*  
*Watershed Morphology*  
*See Soil Science and Mechanics*  
*Earth Structures*

## **Signal Analysis**

## **Slump**

*Electronic Systems*

*See Geomorphology*  
*Mass Wasting*

## **Silt**

*Soil Science and Mechanics*  
*Soil Types*

## **Small Watersheds**

*See Watersheds*

## **Silting**

## **Smoke**

**LAKE HARBOR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA**  
**15.0006**

*See Fire Research*  
*Fire Control*

## **Silviculture**

## **Smoke - Soot**

*See Air Pollution*

## Snow Composition

*See Glaciology*  
*Snow Studies*

## Snow Studies

*See Glaciology*

## Snowmelt

*See Water Supply*

## Snowmelt Runoff

*See Water Runoff*

## Snowpack

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

SNOW PACK STABILITY INDICES RELATIVE TO THE  
CLIMAX AVALANCHE ...1.0013

NATIONAL FIRE DANGER RATING ...5.0027

PHYSICAL EVALUATION OF CLOUD SEEDING  
TECHNIQUES FOR MODIFYING OROGRAPHIC SNOW-  
FALL - THE CASCADE PROJECT ...11.0007

## Snowslides

*See Geomorphology*  
*Mass Wasting*

## Social Aspects

*See Water Resources Management*

## Social Environment

*See Urban Research*

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

PLAN FORMULATION AND EVALUATION IN MULTIPLE  
PURPOSE WATER RESOURCE PROJECT - A  
FRAMEWORK FOR REGIONAL PLANNING (ABBREV)  
...6.0175

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RE-  
SIDENT ATTITUDES AND PERCEPTIONS AND THEIR  
IMPLICATIONS TO FLOOD PLAIN MANAGEMENT  
POLICY ...6.0239

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL  
FLOOD CONTROL ON THE IOWA RIVER, IOWA  
...6.0273

HYDROLOGIC EFFECTS OF URBANIZATION IN THE  
UNITED STATES ...6.0338

TORNADOES ...12.0021

SUMMARY REPORT - WEATHER MODIFICATION -  
FISCAL YEARS 1969, 1970, 1971 ...16.0045

EMERGENCY OPERATIONS CONTINGENCY PLANNING -  
NEW ORLEANS, LOUISIANA ...16.0059

DEVELOPMENT OF IMPROVED EMERGENCY OPERA-  
TIONS SIMULATION TRAINING (EOST) TRAINING  
PROCEDURES ...16.0060

DISASTER RELIEF - DOMESTIC ACTION IN THE SPOT-  
LIGHT ...16.0101

## COMMUNITY STUDIES

THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN  
...3.0149

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN LUZERNE-WYOMING COUNTIES,  
COMMONWEALTH OF PENNSYLVANIA ...6.0011

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK  
HAVEN, PENNSYLVANIA ...6.0024

MODEL CITIES ONE - URBAN RENEWAL PROJECT,  
READING, PENNSYLVANIA ...6.0025

PENN-SUSQUEHANNA URBAN RENEWAL PROJECT,  
HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-  
634C ...6.0026

MILTON SOUTH, MILTON NORTH AND TURBOT  
TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS,  
PENNSYLVANIA ...6.0027

DOWNTOWN URBAN RENEWAL PROJECT, WILKES-  
BARRE, PENNSYLVANIA ...6.0028

KINGSTON DISASTER URBAN RENEWAL PROJECT,  
BOROUGH OF KINGSTON, LUZERNE COUNTY,  
PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
...6.0148

GLENDORA, CALIFORNIA, GENERAL PLAN 1990  
...6.0170

NORTH RICHMOND - SAN PABLO BAY AREA STUDY -  
CALIFORNIA ...6.0178

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
ILLINOIS ...6.0260

THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR ...6.0360

PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT ...6.0385

THE HOMEPORT STORY - AN IMAGINARY CITY GETS READY FOR A HURRICANE ...8.0023

XENIA REBUILDS ...12.0006

COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES ...15.0026

COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME 1 - OPERATION STRUCTURE AND PROCEDURES ...16.0013

A PERSPECTIVE ON DISASTER PLANNING ...16.0098

ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES ...16.0100

#### CRIMINOLOGY

THE POLICE DEPARTMENT IN NATURAL DISASTER OPERATIONS ...16.0097

#### DEMOGRAPHY

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

PROFILING THE FOREST INCENDIARIST - AN ANALYSIS OF DOCUMENTED CASE HISTORIES ...5.0001

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY ...6.0200

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

DRAINAGE STUDY - INVENTORY AND ANALYSIS ...6.0340

#### GOVERNMENT

THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101

EMERGENCY OPERATIONS SYSTEMS DEVELOPMENT - CIVIL DEFENSE RESCUE PHASE II ...16.0001

PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW ...16.0050

THE CHARLOTTE CONSORTIUM TASK 1 REPORT - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM ...16.0096

#### *Intergovernmental Relations*

PRIORITY AND PLANNING ELEMENTS FOR DEVELOPING ILLINOIS WATER RESOURCES ...6.0262

AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF ...8.0001

PUBLIC HEALTH SERVICE DISASTER ASSISTANCE REPORT JULY 1967-JUNE 1970 ...16.0011

FEDERAL PLAN FOR WEATHER RADARS ...16.0046

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1975 ...16.0070

A FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS ...16.0071

#### *Legislative Processes*

THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN ...3.0149

MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY ...3.0150

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA ...6.0399

PROBING THE LAW AND BEYOND - A QUEST FOR PUBLIC PROTECTION FROM HAZARDOUS PRODUCT CATASTROPHES ...16.0004

PUBLIC HEALTH SERVICE DISASTER ASSISTANCE REPORT JULY 1967-JUNE 1970 ...16.0011

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1975 ...16.0070

#### *Policy Making*

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

HAWAII ENVIRONMENTAL SIMULATION MODEL ...6.0252

THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

A COMPARATIVE ANALYSIS OF PUBLIC SUPPORT OF AND RESISTANCE TO WEATHER MODIFICATION PROJECTS ...16.0061

#### LAW AND LEGAL PROCEDURES

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV ...6.0226

PROBING THE LAW AND BEYOND - A QUEST FOR PUBLIC PROTECTION FROM HAZARDOUS PRODUCT CATASTROPHES ...16.0004

THE DEVELOPMENT OF A MEANS FOR ASSESSING  
EMERGENCY MEDICAL RESOURCES ...16.0052

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN  
AN URBAN AREA - PHASE III ...6.0073

PRIORITY AND PLANNING ELEMENTS FOR DEVELOP-  
ING ILLINOIS WATER RESOURCES ...6.0262

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE  
WATER RESOURCES POLICIES IN MINNESOTA  
...6.0306

WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379

EVALUATION OF POLICY-RELATED RESEARCH IN THE  
FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND  
SERVICES - EMERGENCY MEDICAL SERVICES  
...16.0022

INITIAL OBSERVATIONS ON PROBLEMS AND DIFFICUL-  
TIES IN THE USE OF LOCAL FOC'S IN NATURAL DIS-  
ASTERS ...16.0049

PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS  
OVERVIEW ...16.0050

PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION  
TASK COMPLETION REPORT ...16.0051

NATURAL DISASTER OPERATIONS PLANNING ...16.0053

NATIONAL ATMOSPHERIC SCIENCES PROGRAM -  
FISCAL YEAR 1974 ...16.0076

THE INVESTIGATION OF SHELTER MANAGEMENT AND  
CONTROL IN NATURAL DISASTER ...16.0079

THE CHARLOTTE CONSORTIUM TASK I REPORT -  
VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES -  
PUBLIC SAFETY SUBSYSTEM ...16.0096

THE POLICE DEPARTMENT IN NATURAL DISASTER  
OPERATIONS ...16.0097

THE WARNING SYSTEM IN DISASTER SITUATIONS - A  
SELECTIVE ANALYSIS ...16.0099

THE WICHITA FALLS CONSORTIUM PHASE I REPORT -  
VOLUME III - ANALYSIS OF MUNICIPAL ACTIVITIES -  
SECTION IV - PUBLIC SAFETY SUBSYSTEM ...16.0103

#### MANPOWER

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN CENTRAL REGION, COMMON-  
WEALTH OF PENNSYLVANIA ...6.0008

TRAINING AND EVALUATION OF MENTAL HEALTH  
SERVICES TO RESIDENTS OF FLOOD DISASTER  
AREAS IN COMMONWEALTH OF PENNSYLVANIA  
...6.0010

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES  
- AN APPROACH TO FLOOD PLAIN MANAGEMENT  
...6.0257

#### MOBILITY

FACTORS AFFECTING RELOCATION IN RESPONSE TO  
RESERVOIR DEVELOPMENT ...6.0004

MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD  
DISASTER AREAS IN CENTRAL REGION, COMMON-  
WEALTH OF PENNSYLVANIA ...6.0008

EVACUATION OF COASTAL RESIDENTS DURING HUR-  
RICANES A PILOT STUDY FOR DADE COUNTY,  
FLORIDA ...8.0026

AREA-WIDE DISASTER RESPONSE - CIVIL  
PREPAREDNESS AND REGIONAL COUNCILS ...16.0108

#### ORGANIZATION STUDIES

NATIONAL EARTHQUAKE INFORMATION SERVICE  
...3.0051

PROCEEDINGS - COMMUNITY WORKSHOP ON FLOOD  
INSURANCE ...6.0012

HAWAII ENVIRONMENTAL SIMULATION MODEL  
...6.0252

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL  
SYSTEM RELATED TO DRAINAGE PROBLEMS OF  
URBAN AREAS ...6.0390

PROBING THE LAW AND BEYOND - A QUEST FOR  
PUBLIC PROTECTION FROM HAZARDOUS PRODUCT  
CATASTROPHES ...16.0004

THE SALVATION ARMY - ITS STRUCTURE, OPERA-  
TIONS, AND PROBLEMS IN DISASTERS ...16.0017

COMMUNICATIONS IN NATURAL DISASTERS ...16.0033

SECURING COMMUNITY RESOURCES FOR SOCIAL AC-  
TION ...16.0087

THE POLICE DEPARTMENT IN NATURAL DISASTER  
OPERATIONS ...16.0097

ORGANIZATIONAL RESPONSES TO MAJOR COMMUNI-  
TY CRISES ...16.0100

AREA-WIDE DISASTER RESPONSE - CIVIL  
PREPAREDNESS AND REGIONAL COUNCILS ...16.0108

#### RELIGION

THE SALVATION ARMY - ITS STRUCTURE, OPERA-  
TIONS, AND PROBLEMS IN DISASTERS ...16.0017

VOIR ...6.0360  
THE WARNING SYSTEM IN DISASTER SITUATIONS - A  
SELECTIVE ANALYSIS ...16.0099

### **Social Structure**

*See Social Sciences*

### **Social Workers**

*See Occupations, Populations*

### **Soil Cement**

*See Soil Science and Mechanics*  
*Soil Types*

### **Soil Dynamics**

*See Soil Science and Mechanics*

### **Soil Leaching**

FIRE ON A FOREST SOIL ...5.0047

### **Soil Maps**

*See Techniques and Instrumentation*  
*Maps and Surveys*

### **Soil Pollution**

*See Soil Science and Mechanics*

### **Soil Science and Mechanics**

ECONOMIC EVALUATION OF USE AND DEVELOPMENT  
OF WATER AND LAND RESOURCES ...2.0017

SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN  
METROPOLITAN AREAS ...3.0229

MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER  
BASIN, MERAMEC RIVER, MISSOURI ...3.0242

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES,  
MACON COUNTY, ILLINOIS ...6.0258

APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA - REGION EIGHT - 1971  
...6.0350

...6.0413

### **BACKFILLS**

DEMONSTRATION OF A TECHNIQUE FOR LIMITING  
THE SUBSIDENCE OF LAND OVER ABANDONED  
MINES ROCK SPRINGS, WYOMING ...10.0033

### **BEARING CAPACITY**

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY  
BRIDGES ...3.0003

### **BURIED STRUCTURES**

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 ...3.0017

### **CHEMICAL PROPERTIES**

REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003

FIRE ON A FOREST SOIL ...5.0047

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...9.0049

LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS  
...10.0028

### **CONSERVATION**

LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085

KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES ...6.0195

UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
...6.0196

RUNOFF FROM SMALL AGRICULTURAL AREAS IN IL-  
LINOIS ...6.0265

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

LAKE SHORE EROSION IN ILLINOIS ...15.0020

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...15.0029

### **COVER CROPS**

EFFECT OF PRESCRIBED BURNING ON WATER YIELD  
AND QUALITY FROM BRUSH INFESTED LANDS -  
TEXAS ...5.0022

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

ON THE TEXAS COAST ...3.0018  
PLANT SPECIES AS WILDLIFE COVER AND EROSION  
CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESER-  
VOIR SYSTEMS ...15.0008

#### DRAINAGE

LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085  
STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

#### EARTH STRUCTURES

EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS  
DURING EARTHQUAKES - ALASKA AND CALIFORNIA  
...3.0094  
SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103

#### Cuts

THE SAN FERNANDO EARTHQUAKE SOILS AND  
GEOLOGIC INVESTIGATIONS IN RELATION TO  
HIGHWAY DAMAGE ...3.0012  
CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GOR-  
MAN, CALIFORNIA ...9.0017  
A SURVEY OF EARTH SLOPE FAILURES AND REMEDI-  
AL MEASURES IN TEXAS ...9.0023

#### Dams

EARTH AND ROCKFILL DAM DESIGN PRACTICES  
...3.0171  
EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES  
IN EARTH DAMS ...3.0231  
ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME I ...6.0015  
ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040  
ENGINEERING GEOLOGY - ILLINOIS ...9.0011  
ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021

#### Embankments

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS  
...3.0010  
THE SAN FERNANDO EARTHQUAKE SOILS AND  
GEOLOGIC INVESTIGATIONS IN RELATION TO  
HIGHWAY DAMAGE ...3.0012  
APPLICATION OF PROBABILITY, STATISTICS AND DECISION  
THEORY IN SOIL ENGINEERING ...3.0137  
STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415  
EARTHWORK REINFORCEMENT TECHNIQUES - LOS AN-  
GELES AREA ...9.0005

INVESTIGATION OF RED RIVER VALLEY GEOLOGY -  
EFFECTS ON STRUCTURE DESIGN AND PER-  
FORMANCE ...9.0018

A SURVEY OF EARTH SLOPE FAILURES AND REMEDI-  
AL MEASURES IN TEXAS ...9.0023

COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE  
PROTECTION FOR EARTH EMBANKMENTS ...9.0025

LIME SOIL STABILIZATION STUDY ...9.0037

#### Reservoirs

ENGINEERING GEOLOGY - ILLINOIS ...9.0011

ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021

#### Retaining Walls

EARTHQUAKE STABILITY OF REINFORCED EARTH  
STRUCTURES ...3.0037  
APPLICATION OF PROBABILITY, STATISTICS AND DECISION  
THEORY IN SOIL ENGINEERING ...3.0137

#### Slopes

THE SAN FERNANDO EARTHQUAKE SOILS AND  
GEOLOGIC INVESTIGATIONS IN RELATION TO  
HIGHWAY DAMAGE ...3.0012  
ANALYSIS OF THE SLIDES IN THE SAN FERNANDO  
DAMS DURING THE EARTHQUAKE OF FEBRUARY 9,  
1971 ...3.0095  
ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO  
BAY REGION - CALIFORNIA ...3.0109  
GREATER ANCHORAGE AREA BOROUGH, ALASKA  
...3.0172  
LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON  
...3.0267  
REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA  
AND PENNSYLVANIA ...9.0002  
RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A  
REVIEW OF PRACTICES AND PROCEDURES ...9.0008  
LOCATION OF SLOPE FAILURE PLANES ...9.0009  
LANDSLIDES - KENTUCKY ...9.0015  
SLOPE STABILITY OF CUTS IN ONTONAGON CLAY  
...9.0016  
CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GOR-  
MAN, CALIFORNIA ...9.0017  
INVESTIGATION OF RED RIVER VALLEY GEOLOGY -  
EFFECTS ON STRUCTURE DESIGN AND PER-  
FORMANCE ...9.0018  
SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL  
SOILS ...9.0019  
FLOW SLIDE CONTROL WITH SLOPE REVETMENTS  
...9.0020  
ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021

MEASURES IN TEXAS ...9.0023  
 MECHANISMS OF DEBRIS AVALANCHING IN SHALLOW  
 SOILS OF SOUTHEAST ALASKA ...9.0024  
 COMPARATIVE RESEARCH ON SOIL-CEMENT SLOPE  
 PROTECTION FOR EARTH EMBANKMENTS ...9.0025  
 EFFECTS OF DEFORESTATION ON THE STABILITY OF  
 EARTH SLOPES - OREGON, WASHINGTON ...9.0051  
 EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY  
 OF NATURAL SLOPES ...9.0052  
 STRENGTH FROM FAILURE CASES ...9.0054  
 RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
 AREA, ALASKA ...13.0018  
 ENGINEERING RESEARCH - CALIFORNIA ...16.0056

## EROSION AND EROSION CONTROL

EFFECTS OF PRESCRIBED BURNING ON WATER YIELD  
 AND QUALITY FROM BRUSH INFESTED LANDS -  
 ...5.0022  
 HYDROLOGY AND URBAN WATER RESOURCES  
 OF THE ISLAND OF OAHU, HAWAII ...6.0076  
 LABORATORY STUDIES OF CONSERVATION AND  
 EARTH STRUCTURES ...6.0085  
 VALLEY URBAN HYDROLOGY STUDY,  
 CALIFORNIA ...6.0168  
 HYDROLOGY OF POWAY VALLEY, CALIFOR-  
 NIA ...6.0169  
 GEOLOGY OF SMALL WATERSHEDS ...6.0190  
 KANSAS WATERSHED, KANSAS ...6.0202  
 ROAD-FILL DAM, KANSAS ...6.0203  
 GEOLOGY OF STREAMS IN ST. LOUIS  
 METROPOLITAN AREA ...6.0317  
 WATER CONSERVATION NEEDS INVENTORY,  
 GRAYSON AND FANNIN COUNTIES, TEXAS  
 ...1  
 GEOLOGIC EFFECTS OF A SMALL RESERVOIR ON  
 WATER SYSTEM OF NEDERLO CREEK, WISCON-  
 SIN ...6.0408  
 EFFECTS OF GRASSES FOR DUNE STABILIZATION  
 ALONG THE GULF COAST WITH INITIAL EMPHASIS  
 ON THE TEXAS COAST ...8.0049  
 COMPARATIVE RESEARCH ON SOIL-CEMENT SLOPE  
 PROTECTION FOR EARTH EMBANKMENTS ...9.0025  
 EFFECTS OF DEFORESTATION ON THE STABILITY OF  
 EARTH SLOPES - OREGON, WASHINGTON ...9.0051  
 EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY  
 OF NATURAL SLOPES ...9.0052  
 STUDIES IN SOUTHEASTERN OHIO ...9.0057  
 STABILIZATION OF STEEP LAND SLOPES - OHIO  
 ...9  
 ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL  
 SLOPES - ALASKA AND OHIO ...9.0060  
 EROSION AND SEDIMENT REDUCTION IN STEEP UNSTA-  
 BILIZED LANDS OF THE SOUTHWEST ...15.0002  
 EFFECTS OF SPECIES AS WILDLIFE COVER AND EROSION  
 CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESER-  
 VOIR SYSTEMS ...15.0008

UNIFORM EROSION OF SOILS ...15.0012  
 SAN FRANCISCO BAY ...15.0013  
 DEPOSITION OF HAWAIIAN WATERSHED AND  
 ESTUARINE SEDIMENTS ...15.0018  
 LAKE SHORE EROSION IN ILLINOIS ...15.0020  
 ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
 NORTHWESTERN VERMONT ...15.0038  
 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY  
 IN THE CENTRAL APPALACHIAN REGION - VIR-  
 GINIA ...15.0039  
 URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NA-  
 TURE, MAGNITUDE, AND COSTS OF GEOLOGIC  
 HAZARDS AND RECOMMENDATIONS FOR THEIR  
 MITIGATION (ABBREV) ...16.0025  
 NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
 RELATIONSHIPS TO PLANNING, LOCATION AND  
 DESIGN OF TRANSPORTATION FACILITIES ...16.0035  
 SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

## FOUNDATIONS

EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS  
 INCLUDING FOUNDATION INTERACTION ...3.0030  
 EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDA-  
 TION SYSTEMS ...3.0036  
 EARTHQUAKE STABILITY OF REINFORCED EARTH  
 STRUCTURES ...3.0037  
 EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION  
 SYSTEMS ...3.0041  
 SHEAR MODULUS AND DAMPING IN SOILS - MEASURE-  
 MENT AND PARAMETER EFFECTS ...3.0060  
 ADAP - A COMPUTER PROGRAM FOR STATIC AND  
 DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077  
 DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY  
 BRACED STEEL BUILDING ...3.0091  
 PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN  
 7-1/2-MINUTE QUADRANGLES AND VICINITY,  
 CALIFORNIA ...3.0121  
 GREATER ANCHORAGE AREA BOROUGH, ALASKA  
 ...3.0172  
 EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
 ...3.0183  
 SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197  
 A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN  
 EARTHQUAKE ENGINEERING ...3.0252  
 INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAM-  
 IC FOUNDATION RESPONSE ...3.0273  
 INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOP-  
 MENT IN EXPANSIVE CLAYS ON DAMAGE TO MILI-  
 TARY FACILITIES (ABBREV) ...4.0002  
 REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
 ...4.0003  
 GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
 ...4.0004  
 STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
 ...4.0007  
 SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST  
 POINT, NEW YORK ...9.0010

## LANDSLIDES

- AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT ...1.0006
- THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE ...3.0012
- A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097
- UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008
- REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA ...9.0002
- EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005
- LOCATION OF SLOPE FAILURE PLANES ...9.0009
- SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK ...9.0010
- ENGINEERING GEOLOGY - ILLINOIS ...9.0011
- WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL ...9.0013
- INVESTIGATION OF LANDSLIDES ON HIGHWAYS ...9.0014
- LANDSLIDES - KENTUCKY ...9.0015
- SLOPE STABILITY OF CUTS IN ONTONAGON CLAY ...9.0016
- CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA ...9.0017
- INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE ...9.0018
- SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019
- ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021
- LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022
- A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023
- SANTA CRUZ COUNTY COOP ...9.0027
- EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION ...9.0028
- LIME SOIL STABILIZATION STUDY ...9.0037
- EVALUATION OF 'ION EXCHANGE' LANDSLIDE CORRECTION TECHNIQUE - CALIFORNIA ...9.0038
- GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA ...9.0041
- DENVER METROPOLITAN AREA, COLORADO ...9.0042

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025

## LIQUEFACTION

- A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097
- SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103
- EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION ...3.0107
- ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...3.0122
- ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES ...3.0209
- SEISMIC RESEARCH ...3.0225
- LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING ...3.0234
- DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279
- FLOW SLIDE CONTROL WITH SLOPE REVETMENTS ...9.0020
- STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...10.0010
- ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...10.0021
- VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOCLOGY INVESTIGATIONS - SOILS PHASE) ...10.0030
- RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018
- SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

## MECHANICAL PROPERTIES

### *Cohesion*

- ROCK STRENGTH FROM FAILURE CASES ...9.0054

### *Compressive Strength*

- ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971 ...3.0095
- LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

### *Creep and Rheology*

- EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051



LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

#### *Elasticity*

DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279

#### *Shear Strength*

SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS ...3.0060

SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES ...3.0096

SOIL LIQUEFACTION DURING EARTHQUAKES ...3.0103

SHEAR MODULUS AND DAMPING IN SOILS - DESIGN EQUATIONS AND CURVES ...3.0216

SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK ...9.0010

WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL ...9.0013

LANDSLIDES - KENTUCKY ...9.0015

SLOPE STABILITY OF CUTS IN ONTONAGON CLAY ...9.0016

INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE ...9.0018

EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMODOLOGY INVESTIGATIONS - SOILS PHASE) ...10.0030

#### *MICROBIOLOGY*

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...6.0041

#### *NUTRIENTS/FERTILIZERS*

DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS ...5.0011

CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020

SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS ...10.0028

#### *PHYSICAL PROPERTIES*

SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE RESPONSE ANALYSIS OF HORIZONTALLY LAYERED SITES ...3.0035

ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085

PALEO ALCO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA ...3.0121

THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151

ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159

LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON ...3.0267

EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE ...3.0269

SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS ...3.0278

MAPPING OF SURFACE MATERIALS FOR PREDICTING FOUNDATION CHARACTERISTICS IN FUTURE DEVELOPMENT OF HATTIESBURG ...4.0009

FIRE ON A FOREST SOIL ...5.0047

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...6.0041

SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK ...9.0010

STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS ...9.0012

INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE ...9.0018

COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE PROTECTION FOR EARTH EMBANKMENTS ...9.0025

LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO ...9.0060

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...10.0003

STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA/ VOLUME I ...10.0025

VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMODOLOGY INVESTIGATIONS - SOILS PHASE) ...10.0030

EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS ...15.0034

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025

SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0101

#### *Density*

EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE ...3.0183

DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279

REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003

#### *Grain Shape*

EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
...3.0183

#### *Grain Size and Distribution*

EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
...3.0183

#### *Permeability*

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

#### *Radiation Emission*

NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

#### *Swelling - Shrinking*

INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV) ...4.0002

REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...4.0004

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...4.0005

STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
...4.0007

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008

#### *Temperature*

FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISTASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING ...9.0035

SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS  
...10.0028

#### *Void Ratio and Porosity*

SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS ...3.0060

INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV) ...4.0002

#### *Water Content*

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI ...2.0015

DROUGHT AND WET SPELLS IN NORTH DAKOTA  
...2.0020

...4.0003

URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076

THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373

SLOPE STABILITY OF CUTS IN ONTONAGON CLAY  
...9.0016

SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022

A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023

EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES ...9.0052

THE INFLUENCE OF CLAY MINERALS ON SURFICIAL EARTH MOVEMENTS ...9.0056

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

#### *Pressure*

##### *Hydrostatic*

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES ...3.0003

##### *Pore Water*

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...3.0067

EARTH AND ROCKFILL DAM DESIGN PRACTICES  
...3.0171

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS ...3.0231

INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV) ...4.0002

LANDSLIDES - KENTUCKY ...9.0015

FLOW SLIDE CONTROL WITH SLOPE REVETMENTS  
...9.0020

LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
...10.0011

##### *Uplift*

REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003

## SETTLEMENT

- THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE ...3.0012
- DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING ...10.0033
- RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018
- URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025
- SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

## SOIL DYNAMICS

- STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES ...3.0033
- THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087
- MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS ...3.0093
- EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA ...3.0094
- SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES ...3.0096
- EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171
- EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE ...3.0183
- NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228
- EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS ...3.0231
- DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279
- WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL ...9.0013
- FLOW SLIDE CONTROL WITH SLOPE REVETMENTS ...9.0020

## SOIL POLLUTION

- SOIL POLLUTION - EROSION EFFECTS IN SOIL ...16.0106

- LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES ...3.0003
- INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE ...3.0083
- THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY ...3.0151
- STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT I. ...3.0233
- INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE ...3.0273
- SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS ...3.0278
- INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060
- COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332
- SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019
- MEASURE AND DEPICT TROUBLE AREAS IN STEREO. MODELS - OHIO ...10.0031

## Aggregate

- SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043

## Clay

- SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES ...3.0096
- EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE ...3.0183
- INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV) ...4.0002
- REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS ...4.0003
- STABILIZATION OF EXPANSIVE CLAYS AND SHALES ...4.0007
- MAPPING OF SURFACE MATERIALS FOR PREDICTING FOUNDATION CHARACTERISTICS IN FUTURE DEVELOPMENT OF HATTIESBURG ...4.0009
- SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK ...9.0010
- SLOPE STABILITY OF CUTS IN ONTONAGON CLAY ...9.0016
- CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA ...9.0017
- A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023
- THE INFLUENCE OF CLAY MINERALS ON SURFICIAL EARTH MOVEMENTS ...9.0056
- LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011

MENT AND PARAMETER EFFECTS ...3.0060  
SHEAR MODULUS AND DAMPING IN SOILS - DESIGN  
EQUATIONS AND CURVES ...3.0216  
DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279

*Consolidated*

SHEAR MODULUS AND DAMPING IN SOILS - MEASURE-  
MENT AND PARAMETER EFFECTS ...3.0060  
SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

*Disturbed - Undisturbed*

SHEAR MODULUS AND DAMPING IN SOILS - MEASURE-  
MENT AND PARAMETER EFFECTS ...3.0060  
SHEAR MODULUS AND DAMPING IN SOILS - DESIGN  
EQUATIONS AND CURVES ...3.0216  
LAND-SURFACE SUBSIDENCE, TEXAS CITY AND  
SEABROOK AREAS, TEXAS ...10.0012

*Expansive*

INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOP-  
MENT IN EXPANSIVE CLAYS ON DAMAGE TO MILI-  
TARY FACILITIES (ABBREV) ...4.0002  
REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003  
GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...4.0004  
STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
...4.0007  
UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008  
URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, AND COSTS OF GEOLOGIC  
HAZARDS AND RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...16.0025

*Glacial*

MECHANICS OF DEBRIS AVALANCHING IN SHALLOW  
TILL SOILS OF SOUTHEAST ALASKA ...9.0024

*Granular*

ANALYSIS OF LIQUEFACTION OF SATURATED GRANU-  
LAR SOILS DURING EARTHQUAKES ...3.0209  
DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279  
FLOW SLIDE CONTROL WITH SLOPE REVETMENTS  
...9.0020  
RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
SITKA AREA, ALASKA ...13.0018  
SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

*Layered System*

SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE  
RESPONSE ANALYSIS OF HORIZONTALLY LAYERED  
SITES ...3.0035  
NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

MENT AND PARAMETER EFFECTS ...3.0060  
A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL  
LIQUEFACTION POTENTIAL ...3.0097  
SHEAR MODULUS AND DAMPING IN SOILS - DESIGN  
EQUATIONS AND CURVES ...3.0216  
HYDRAULICS OF SHALLOW FLOWS OVER STABLE  
ERODED SAND SURFACES DEFINED BY AREA SPEC-  
TRA ...6.0269  
STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
AS A MECHANISM FOR FAILURE OF MILITARY IN-  
STALLATIONS ...10.0010

VERIFICATION OF EMPIRICAL METHOD OF DETERMIN-  
ING RIVERBANK STABILITY (POTAMODOLOGY IN-  
VESTIGATIONS - SOILS PHASE) ...10.0030

*Saturated*

SHEAR MODULUS AND DAMPING IN SOILS - MEASURE-  
MENT AND PARAMETER EFFECTS ...3.0060  
EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
...3.0183  
ANALYSIS OF LIQUEFACTION OF SATURATED GRANU-  
LAR SOILS DURING EARTHQUAKES ...3.0209  
INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOP-  
MENT IN EXPANSIVE CLAYS ON DAMAGE TO MILI-  
TARY FACILITIES (ABBREV) ...4.0002  
REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS  
...4.0003  
MECHANICS OF DEBRIS AVALANCHING IN SHALLOW  
TILL SOILS OF SOUTHEAST ALASKA ...9.0024  
HYDRAULIC EROSION OF SOILS ...15.0012

*Shale*

STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
...4.0007  
ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021  
LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
POTENTIAL IN THE PIERRE SHALE ...9.0022  
A SURVEY OF EARTH SLOPE FAILURES AND REMEDI-  
AL MEASURES IN TEXAS ...9.0023

*Silt*

SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC  
RESPONSE ANALYSES ...3.0096  
EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
...3.0183  
SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...14.0012

*Soil Cement*

COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE  
PROTECTION FOR EARTH EMBANKMENTS ...9.0025

INVESTIGATION OF GROUND MOTION-DAMAGE RELATIONSHIPS FOR RESIDENTIAL BUILDINGS IN GLENDALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE, FEBRUARY 1 ...3.0013

EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS ...3.0036

EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS ...3.0041

DYNAMICS OF BUILDING - SOIL INTERACTION ...3.0043

ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS ...3.0085

NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228

INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV) ...4.0002

### STABILITY ANALYSIS

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES ...3.0003

ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109

EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171

EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE ...3.0183

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS ...3.0231

STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT 1. ...3.0233

LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON ...3.0267

DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA ...9.0002

EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005

LANDSLIDES - KENTUCKY ...9.0015

SLOPE STABILITY OF CUTS IN ONTONAGON CLAY ...9.0016

SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019

ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA ...9.0021

A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023

MECHANICS OF DEBRIS AVALANCHING IN SHALLOW TILL SOILS OF SOUTHEAST ALASKA ...9.0024

EVALUATION OF 'ION EXCHANGE' LANDSLIDE CORRECTION TECHNIQUE - CALIFORNIA ...9.0038

EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES, OREGON WASHINGTON 9.0051

VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLOGY INVESTIGATIONS - SOILS PHASE) ...10.0030

RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA ...13.0018

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

### STRESSES

SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS ...3.0060

APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING ...3.0137

EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS ...3.0231

SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS ...3.0278

EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES ...9.0052

### TECHNIQUES AND INSTRUMENTATION

DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME I ...6.0015

EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA ...9.0005

### Air Photo Interpretation

FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS ...6.0145

DEVELOPING REMOTE SENSING TECHNIQUES FOR AIDING PREDICTION OF LANDSLIDES ...9.0058

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO ...10.0031

### Compaction Test

EARTH AND ROCKFILL DAM DESIGN PRACTICES ...3.0171

LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011

### Consolidation Test

LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012

### Direct Shear and Plane Shear

LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING ...3.0234

LANDSLIDES - KENTUCKY ...9.0015

HYDRAULIC EROSION OF SOILS ...15.0012

### In Situ Test

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

### Load Tests

INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT ON THE STABILITY OF NATURAL SLOPES

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
NO. 1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
POTENTIAL IN THE PIERRE SHALE ...9.0022

#### *Permeability*

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

#### *Piezometers*

EARTH AND ROCKFILL DAM DESIGN PRACTICES  
...3.0171

#### *Stabilization*

STABILIZATION OF EXPANSIVE CLAYS AND SHALES  
...4.0007

JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL  
AND HURRICANE PROTECTION ...8.0028

WATER DRAINAGE FROM IN-PLACE FILLS TO  
PREVENT OR HALT FILL ...9.0013

ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021

A SURVEY OF EARTH SLOPE FAILURES AND REMEDI-  
AL MEASURES IN TEXAS ...9.0023

COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE  
PROTECTION FOR EARTH EMBANKMENTS ...9.0025

LIME SOIL STABILIZATION STUDY ...9.0037

ENVIRONMENTAL GEOMORPHIC STUDY OF THE  
COASTAL REGIMES ALONG THE SOUTH SHORE OF  
LONG ISLAND - NEW YORK ...15.0027

#### *Triaxial Test*

EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
...3.0183

SEISMIC RESEARCH ...3.0225

LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER  
DYNAMIC AND STATIC LOADING ...3.0234

STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK  
UNDER TRIAXIAL CONDITIONS ...9.0012

LANDSLIDES - KENTUCKY ...9.0015

#### *Vane Test*

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

#### *Water Content Test*

SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL  
SOILS ...9.0019

#### *Soil Surveys*

*See Soil Science and Mechanics*

*See Soil Science and Mechanics*

#### **Solar Energy**

*See Energy Conversion*

*Natural Energy Sources*

#### **Solid Waste Management**

##### **DISPOSAL**

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV) ...6.0308

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

##### **ENVIRONMENTAL IMPACT**

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

##### **MANAGEMENT AND PLANNING**

PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...6.0119

URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN  
MANAGEMENT, SANITARY SEWERAGE, SOLID  
WASTE MANAGEMENT (ABBREV) ...6.0307

URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV) ...6.0308

##### **WASTE TYPE**

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME I ...6.0015

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

RETURNING UNDERGROUND COAL MINE WASTES TO  
MINED-OUT VOIDS ...10.0026

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

ography  
ographic Instrumentation

PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RE-  
LIEF ...6.0002

DELIVERING VOCATIONAL REHABILITATION SERVICES  
IN A DISASTER AREA ...6.0014

PRIORITY AND PLANNING ELEMENTS FOR DEVELOP-  
ING ILLINOIS WATER RESOURCES ...6.0262

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
& FLOOD INUNDATION - NEW JERSEY ...6.0326

## Space Communication

onic Systems  
unication Systems

## Spectral Reflectance

iques and Instrumentation  
e Sensing

## Static

See *Engineering Mechanics*  
*Forces and Loadings*

## Spillways

ulics

## Statistical Models

See *Information Systems Research*  
*Mathematical Models*

## Stability

eeering Mechanics

## Steel Structures

See *Mechanics of Structures*

## Stability Analysis

cience and Mechanics

## Stiffness and Flex

See *Engineering Mechanics*  
*Mechanical Vibrations*

## Stabilization

cience and Mechanics  
iques and Instrumentation

## Stilling - Settling Basins

See *Hydraulics*

## Standards & Criteria

portation Engineering  
n

## Stochastic Models

See *Information Systems Research*  
*Mathematical Models*

## State - Local Governments

r Resources Management

## Storage and Retention

See *Waste Water Treatment/Disposal*  
*Sewage System*

## State Government

& Water  
lative Levels

## Storm Modification

See *Meteorology*  
*Weather Modification*

## State Lands

## Storm Runoff

MIC SAFETY STUDY FOR THE GENERAL PLAN

See *Water Runoff*

See Oceanography  
Sea Water Motion

## Storms and Squalls

See Meteorology  
Atmosphere Disturbance

## Strain

See Engineering Mechanics

## Strain Gauges

See Engineering Mechanics  
Analysis  
See Geophysics  
Geophysical Instrumentation

## Stratigraphy

See Also Oceanography  
Marine Geology

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...3.0170

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...3.0181

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

## CORRELATION

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

## FORMATION

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSIS-  
SIPPI ...9.0053

## Crustal History

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

SOUTHERN CALIFORNIA TECTONICS ...3.0112

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

## Physiographic History

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...1.0010

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

## Sea Level Changes

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...9.0043

## Sedimentary History

MONTEREY BAY - CALIFORNIA ...3.0116

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGO  
TO WILMINGTON, CALIFORNIA ...9.0033

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

## Tectonic History

SOUTHERN CALIFORNIA TECTONICS ...3.0112

REGIONAL TECTONIC ANALYSIS - SAN ANDREAS  
FAULT - INVESTIGATION OF BORREGO MOUNTAIN  
EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-  
BREV) ...3.0113

MONTEREY BAY - CALIFORNIA ...3.0116

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFOR-  
NIA ...3.0120

TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL  
MARGIN - ALASKA ...3.0131

AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...3.0185

MEASUREMENTS FOR FAULT SLIP ON THE DENALI,  
FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS,  
ALASKA ...3.0259

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262

SAN FRANCISCO BAY ...15.0013



## LITHOLOGY

REY BAY - CALIFORNIA ...9.0030

### LOCAL STRATIGRAPHY

RIVER BASIN, PART F - SOUTHERN PART,  
HWEST MARGIN - IDAHO ...9.0046

### STRATIGRAPHIC FACIES

EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OCENE DEPOSITS OF THE GULF COASTAL  
...3.0243

### STRATIGRAPHIC SEQUENCE

RIVER BASIN, PART F - SOUTHERN PART,  
HWEST MARGIN - IDAHO ...9.0046

### SUBSURFACE STRATIGRAPHY

RIVER BASIN, PART F - SOUTHERN PART,  
HWEST MARGIN - IDAHO ...9.0046

### VOLCANIC STRATIGRAPHY

RIVER BASIN, PART F - SOUTHERN PART,  
HWEST MARGIN - IDAHO ...9.0046

## Stream Banks

HYDROGRAPH STUDY - WYOMING ...6.0060  
EVALUATION OF EMPIRICAL METHOD OF DETERMIN-  
ING RIVERBANK STABILITY (POTAMOLGY IN-  
VESTIGATIONS - SOILS PHASE) ...10.0030  
ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
HWESTERN VERMONT ...15.0038

## Stream Control Factors

morphology  
ams

## Stream Gradient

morphology  
ams

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA  
...6.0212

## Stream Sediment Yield

EFFECT OF PRESCRIBED BURNING ON WATER YIELD  
AND QUALITY FROM BRUSH INFESTED LANDS -  
TEXAS ...5.0022

URBAN HYDROLOGY AND URBAN WATER RESOURCES  
OF THE ISLAND OF OAHU, HAWAII ...6.0076

LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

THE IMPACT OF URBANIZATION ON WATER YIELD,  
FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALI-  
TY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

PERRIS VALLEY URBAN HYDROLOGY STUDY,  
CALIFORNIA ...6.0168

URBAN HYDROLOGY OF POWAY VALLEY, CALIFOR-  
NIA ...6.0169

MACADOO ROAD-FILL DAM, KANSAS ...6.0203

VERDE LANE FLOOD PREVENTION PROJECT MEA-  
SURE, NEBRASKA ...6.0205

ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
NOFF CHARACTERISTICS - GEORGIA ...6.0244

EFFECT OF URBANIZATION ON FLOOD RUNOFF -  
WICHITA AREA ...6.0282

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK  
ON TEN TASKS ...6.0298

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN  
STUDY FOR THE CITY OF GLENDORA, CALIFORNIA  
...9.0026

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTA-  
BLE BRUSHLANDS OF THE SOUTHWEST ...15.0002

SAN FRANCISCO BAY ...15.0013

DEPOSITION OF HAWAIIAN WATERSHED AND  
ESTUARINE SEDIMENTS ...15.0018

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
ORIENT POINT AND PORT JEFFERSON HARBOR  
...15.0028

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF  
LAKE ERIE ...15.0032

EROSION AND SEDIMENTATION FOLLOWING ROAD  
CONSTRUCTION AND TIMBER HARVEST ON UNSTA

*See Also Geomorphology*

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS  
- ALABAMA ...6.0034

EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062

COLLECTION AND ANALYSIS OF STREAM FLOW AND  
RELATED HYDRAULIC DATA FOR DESIGN OF  
HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064

FLOOD FREQUENCY IN SMALL DRAINAGE AREAS -  
MISSISSIPPI ...6.0065

AN OPTIMUM WATER ALLOCATION MODEL BASED ON  
AN ANALYSIS FOR THE KISSIMEE RIVER BASIN -  
FLORIDA ...6.0066

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN  
FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
...6.0074

FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN  
GEORGIA ...6.0075

DRAINAGE AND FLOOD CONTROL PLAN - MARION  
COUNTY, INDIANA SEPTEMBER 1970 ...6.0087

STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090

FLOOD INVESTIGATIONS - HIGHWAY COMMISSION -  
KANSAS ...6.0091

FLOOD FREQUENCY OF SMALL STREAMS IN LOUI-  
SIANA ...6.0094

HYDROLOGIC DATA COLLECTION VIA GEOSTATIONA-  
RY SATELLITE ...6.0103

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
NORTH CAROLINA ...6.0135

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
NORTH CAROLINA ...6.0136

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL WATERSHEDS IN OKLAHOMA ...6.0140

FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS  
...6.0146

FLOOD INVESTIGATIONS - TENNESSEE ...6.0147

HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE  
AREAS IN TEXAS ...6.0149

FLOODWAY EVALUATIONS BEFORE & AFTER CHAN-  
NEL MODIFICATIONS ASSUMING TOTAL  
METROPOLITAN DEVELOPMENT IN DRAINAGE  
BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

URBAN HYDROLOGY OF POWAY VALLEY, CALIFOR-  
NIA ...6.0169

FLOODS FROM SMALL DRAINAGE AREAS - CALIFOR-  
NIA ...6.0176

FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL  
DRAINAGE AREAS - VIRGINIA ...6.0180

SMALL STREAM FLOOD CHARACTERISTICS ...6.0193

PEAK FLOW FROM SMALL DRAINAGE AREAS - CON-  
NECTICUT ...6.0210

FLOOD FREQUENCY OF ALABAMA STREAMS -  
ALABAMA ...6.0213

FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS  
- ALABAMA ...6.0214

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
DRAINAGE AREAS IN FLORIDA ...6.0233

HYDROGRAPH MODEL STUDIES OF THE HILL-  
SBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS,  
FLORIDA ...6.0234

TRAVEL TIME OF GEORGIA STREAMS ...6.0241

ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
NOFF CHARACTERISTICS - GEORGIA ...6.0244

SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255

FLOOD FREQUENCY STUDY ILLINOIS ...6.0256

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

EVALUATION OF FLOOD RISKS ...6.0264

FLOOD PROFILES OF IOWA STREAMS ...6.0274

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN  
COUNTY, IOWA ...6.0275

FLOOD PROFILES & FLOOD-PLAIN INFORMATION,  
CEDAR RAPIDS, IOWA ...6.0276

FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS  
- IOWA ...6.0278

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
CEDAR RAPIDS, IOWA ...6.0279

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
LINN COUNTY, IOWA ...6.0280

SMALL STREAMS FLOOD FREQUENCY IN MAINE  
...6.0287

DATA AND MANAGEMENT NEEDS FOR WATER RE-  
LATED LAND AREAS - MAINE ...6.0288

FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN VERMONT ...6.0296

FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
BASINS IN RHODE ISLAND ...6.0297

FLOOD PLAIN STUDIES--MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MIN-  
NESOTA RIVER ...6.0305

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
STUDY ...6.0310

...6.0319  
 BASINS AND DRAINAGE BASINS - FULTON COUNTY, YORK ...6.0329  
 INVESTIGATIONS - NEW YORK ...6.0331  
 ES IN THE ANALYSIS OF METROPOLITAN WATER SOURCE SYSTEMS - VOLUME IV - MODELS FOR AGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335  
 AGE STUDY - INVENTORY AND ANALYSIS ...6.0340  
 TS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342  
 TS OF URBANIZATION ON FLOODS AT MORGAN, NORTH CAROLINA ...6.0343  
 TITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344  
 PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP AND TILLAMOOK COUNTIES, OREGON - 1972-1973 ...6.0352  
 PLAIN INUNDATION ...6.0364  
 FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365  
 RIVER WATERSHED PROJECT - TENNESSEE ...6.0368  
 ING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370  
 IIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371  
 HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383  
 HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
 RICAL STUDIES OF UNSTEADY FLOW IN THE ROANOKE RIVER - VIRGINIA ...6.0396  
 HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0400  
 FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401  
 ANAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407  
 LOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408  
 E SENSING APPLICATIONS IN HYDROLOGY AND HYDROLOGY ...9.0050  
 S ON THE FLUVIAL ENVIRONMENT, ARCTIC ALASKA PLAIN PROVINCE, NORTHERN ALASKA VOLUME I ...10.0025

PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971 ...3.0074  
 A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS ...3.0161  
 A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA ...3.0162  
 INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION ...3.0190  
 SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS ...6.0003  
 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA ...6.0008  
 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA ...6.0009  
 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA ...6.0011  
 THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239  
 CONSULTATIVE PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN RAPID CITY, SOUTH DAKOTA ...16.0002  
 TRAINING PROGRAM FOR CRISIS INTERVENORS ...16.0020  
 FIELD STUDIES OF DISASTER BEHAVIOR - AN INVENTORY ...16.0064  
 LABORATORY STUDIES OF THE EFFECTS OF PHYSICAL HAZARD ON SHELTER MANAGEMENT BEHAVIOR - PHASE I - STUDY PLAN ...16.0078  
 AN ANALYSIS OF OPERATING SYSTEM EFFECTIVENESS - FOCUS ON THE BEHAVIOR OF LOCAL COORDINATORS ...16.0085  
 ROLE PERFORMANCE IN THE OPERATING SYSTEM - CIVIL DEFENSE OPERATIONS IN DISASTER ...16.0086  
 COLLABORATIVE RESEARCH ON NATURAL HAZARDS ...16.0094  
 A PERSPECTIVE ON DISASTER PLANNING ...16.0098  
 THE WARNING SYSTEM IN DISASTER SITUATIONS - A SELECTIVE ANALYSIS ...16.0099  
 ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES ...16.0100

#### ISOLATION, SOCIAL & PERCEPTUAL

FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT ...6.0004

#### Strength

#### Stresses

## Structural Analysis

See *Mechanics of Structures*  
See *Structural Geology*

## Structural Design

See *Mechanics of Structures*

## Structural Geology

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...9.0041

### FAULT COMPLEXES

EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA ...3.0071

RELATIVE ACTIVITY OF MULTIPLE FAULT STRANDS - CALIFORNIA ...3.0105

REGIONAL GEOLOGICAL FRAMEWORK, NORTH CENTRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108

SAN ANDREAS FAULT - CALIFORNIA COOP ...3.0111

SOUTHERN CALIFORNIA TECTONICS ...3.0112

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120

A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA ...3.0147

ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLLISTER, CALIFORNIA ...3.0156

AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157

THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT ...3.0160

NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE ...3.0174

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180

A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE ...3.0236

GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...3.0011

ENGINEERING SEISMOLOGY ...3.0019

STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES ...3.0028

TSUNAMI RESEARCH ...3.0049

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES ...3.0056

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102

MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104

RELATIVE ACTIVITY OF MULTIPLE FAULT STRANDS - CALIFORNIA ...3.0105

FAULT ZONE TECTONICS (CREEP) - CALIFORNIA ...3.0110

SAN ANDREAS FAULT - CALIFORNIA COOP ...3.0111

SOUTHERN CALIFORNIA TECTONICS ...3.0112

EARTHQUAKE MODELING ...3.0114

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115

MONTEREY BAY - CALIFORNIA ...3.0116

INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA ...3.0117

MICROEARTHQUAKE DATA ANALYSIS ...3.0119

RANGELY - CALIFORNIA ...3.0123

REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124

STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126

CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO ...3.0127

SEISMIC SOURCE STUDIES - CALIFORNIA ...3.0130

CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135

STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA ...3.0138

STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE ...3.0145

EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA ...3.0153

MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT ...3.0155

AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157

ADRID EARTHQUAKE - ARKANSAS, ILLINOIS,  
UCKY, MISSISSIPPI, MISSOURI AND TENNESSEE  
74

ON 2 DEGREE ...3.0184

RIVER PLAIN, PART B - VOLCANIC ROCKS -  
D ...3.0185

HAZARDS AND LAND-USE PLANNING ...3.0197

GROUND EFFECTS IN THE LIGHT OF NEW  
RIES OF TECTONICS AND EARTHQUAKE  
ANISM ...3.0226

DEARTHQUAKE STUDY OF THE LOWER MISSIS-  
VALLEY - ARKANSAS, MISSISSIPPI AND TEN-  
E ...3.0236

EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
SCENE DEPOSITS OF THE GULF COASTAL  
...3.0243

NCY AND PREMONITORY VARIATIONS OF P, S  
WAVE TIMES ...3.0248

EARTHQUAKE DISTRIBUTION AND MECHANISM OF  
SLIP IN THE RAINBOW MOUNTAIN-DIXIE VAL-  
LEIGHVIEW PEAK AREA, CENTRAL NEVADA  
...3.0250

CHARACTERIZATION OF BRITTLE STRUCTURES WITHIN NEW  
STATE ...3.0256

MEASUREMENTS FOR FAULT SLIP ON THE DENALI,  
HEATHER, AND CASTLE MOUNTAIN FAULTS,  
ALASKA ...3.0259

ACTIVITY AND CONTEMPORARY TECTONICS OF THE  
SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178

REGIONAL SEISMICITY AND TECTONICS OF THE  
WESTERN INTERMOUNTAIN SEISMIC BELT WITH  
BASIS ON THE WASATCH FRONT - UTAH ...3.0276

ACTIVITY OF THE CASCADE VOLCANOES  
...3.0276

GENERAL GEOLOGIC REPORT OF GENERAL PLAN  
FOR THE CITY OF GLENDORA, CALIFORNIA  
...3.0276

SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...14.0012

TRANSFORM FAULTS

EVALUATION OF FEASIBILITY OF MAPPING SEISMI-  
CALLY ACTIVE FAULTS IN ALASKA ...3.0071

SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF  
SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES  
...3.0261

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...10.0016

## Rifts

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039

REGIONAL GEOLOGICAL FRAMEWORK, NORTH CEN-  
TRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108

REGIONAL TECTONIC ANALYSIS - SAN ANDREAS  
FAULT - INVESTIGATION OF BORREGO MOUNTAIN  
EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-  
BREV) ...3.0113

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFOR-  
NIA ...3.0120

TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND  
NEVADA ...3.0133

CALIFORNIA M/EQ NET ...3.0134

A STUDY OF STRONG EARTHQUAKE GROUND MOTION  
USING AN ARRAY OF ACCELEROGRAPHS - CALIFOR-  
NIA ...3.0147

EARTHQUAKES AND ACTIVE FAULTS ...3.0173

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES  
IN NEVADA, IN SUPPORT OF EARTHQUAKE CON-  
TROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
...3.0180

## Thrust Faults

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128

SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...14.0012

## Transform Faults

EVALUATION OF FEASIBILITY OF MAPPING SEISMI-  
CALLY ACTIVE FAULTS IN ALASKA ...3.0071

SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF  
SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES  
...3.0261

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...10.0016

EARTHQUAKE HAZARDS - REDUCTION-NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...3.0181

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

#### JOINTS - FRACTURES

TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND  
NEVADA ...3.0133

EARTHQUAKE DISTRIBUTION AND MECHANISM OF  
FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VAL-  
LEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA  
...3.0250

COMPILATION OF BRITTLE STRUCTURES WITHIN NEW  
YORK STATE ...3.0256

ROCK STRENGTH FROM FAILURE CASES ...9.0054

DETECTION OF SUBSURFACE OPENINGS - INDIANA,  
MISSOURI ...10.0009

ARIZONA EARTH FISSURE INVESTIGATION ...10.0014

#### Rock Mechanics

SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE  
RESPONSE ANALYSIS OF HORIZONTALLY LAYERED  
SITES ...3.0035

MODIFICATION OF SEISMOGRAPH RECORDS FOR EF-  
FECTS OF LOCAL SOIL CONDITIONS ...3.0093

FAULT ZONE TECTONICS (CREEP) - CALIFORNIA  
...3.0110

RANGELY - CALIFORNIA ...3.0123

SEISMIC SOURCE STUDIES - CALIFORNIA ...3.0130

EARTH STRUCTURE AND FAULT TECTONICS AS RE-  
LATED TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT  
ZONE AT HOLLISTER, CALIFORNIA ...3.0156

AN INVESTIGATION OF THE SEISMICITY &  
EARTHQUAKE HAZARDS OF THE SANTA BARBARA  
CHANNEL REGION - CALIFORNIA ...3.0157

SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW  
THEORIES OF TECTONICS AND EARTHQUAKE  
MECHANISM ...3.0226

A MICROEARTHQUAKE STUDY OF THE LOWER MISSIS-  
SIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TEN-  
NESSEE ...3.0236

RESEARCH IN EARTH STRAINS AND FOCAL  
MECHANISMS - MISSOURI ...3.0240

MEASUREMENTS FOR FAULT SLIP ON THE DENALI,  
FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS,  
ALASKA ...3.0259

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS  
OF THE ALEUTIAN ARC - ALASKA ...3.0262

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC  
METHODS ...3.0263

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

REGIONAL SEISMICITY AND TECTONICS OF THE  
SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH  
EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA  
AND PENNSYLVANIA ...9.0002

MOBILIZATION OF DEBRIS FLOWS 9973-EN ...9.0003

STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK  
UNDER TRIAXIAL CONDITIONS ...9.0012

DEVELOP METHODS FOR PREDICTING THE COM-  
PONENTS OF GROUND MOVEMENT ABOVE MINE  
WORKINGS ...10.0005

MICROSEISMIC DETERMINATION OF COAL MINE  
ENTRY STABILITY ...10.0006

SUBSIDENCE AND RELATED ASPECTS OF GEOTHER-  
MAL SYSTEMS ...10.0017

GEODIMETER STUDIES OF CASCADE VOLCANOES -  
WASHINGTON, OREGON AND CALIFORNIA ...14.0006

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

#### Compressive Strength

LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
POTENTIAL IN THE PIERRE SHALE ...9.0022

#### Deformation - Fracture

VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
...3.0006

CRUSTAL DEFORMATION RELEASE, FAILURE AND  
TILTS IN ALASKA ...3.0070

INFLUENCE OF BASE ROCK CHARACTERISTICS ON  
GROUND RESPONSE ...3.0083

EARTHQUAKE MODELING ...3.0114

STUDY OF MECHANISM OF ACCUMULATION AND  
RELEASE OF TECTONIC STRESS IN CENTRAL  
CALIFORNIA ...3.0138

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES  
IN NEVADA, IN SUPPORT OF EARTHQUAKE CON-  
TROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
...3.0180

DEFORMATION CHARACTERISTICS OF HILL SLOPES &  
CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS  
DEPICTED BY REMOTE SENSOR RETURNS - CALIFOR-  
NIA ...9.0036

ROCK STRENGTH FROM FAILURE CASES ...9.0054

COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118  
STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA  
...3.0126  
CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA,  
UTAH AND NEW MEXICO ...3.0127  
CALIFORNIA M/EQ NET ...3.0134

#### *Shear Strength*

EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA  
...3.0115  
ROCK STRENGTH FROM FAILURE CASES - POWER-  
HOUSE SLOPE STABILITY STUDY, FORT PECK DAM,  
MONTANA ...9.0021  
ROCK STRENGTH FROM FAILURE CASES ...9.0054  
DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME  
DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE  
...10.0022

#### *SCARPS*

SEISMICITY OF MENDOCINO ESCARPMENT-GORDA  
RIDGE REGION - CALIFORNIA ...3.0080  
TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND  
NEVADA ...3.0133  
SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...3.0181

#### *STRUCTURAL ANALYSIS*

##### *Local Structure*

VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
...3.0006  
SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...3.0182  
AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

##### *Regional Structure*

VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
...3.0006  
REGIONAL GEOLOGICAL FRAMEWORK, NORTH CENTRAL  
SAN ANDREAS FAULT - CALIFORNIA ...3.0108  
REGIONAL TECTONIC ANALYSIS - SAN ANDREAS  
FAULT - INVESTIGATION OF BORREGO MOUNTAIN  
EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-  
BREV) ...3.0113  
EARTHQUAKE HAZARDS REDUCTION-NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128  
SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -  
IDAHO ...3.0178  
A MICROEARTHQUAKE STUDY OF THE LOWER MISSIS-  
SIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TEN-  
NESSEE ...3.0236

SEISMICITY AND CONTEMPORARY TECTONICS OF THE  
YELLOWSTONE PARK HERGEN LAKE REGION

SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH  
EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276  
DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044  
HAMILTON 2 DEGREE ...9.0048

#### *TECTONIC FEATURES*

EARTH STRUCTURE AND FAULT TECTONICS AS RE-  
LATED TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

##### *Basins*

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

##### *Crust*

HAWAIIAN VOLCANO OBSERVATORY ...3.0057  
CRUSTAL DEFORMATION RELEASE, FAILURE AND  
TILTS IN ALASKA ...3.0070  
SEISMICITY OF MENDOCINO ESCARPMENT-GORDA  
RIDGE REGION - CALIFORNIA ...3.0080  
INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA  
...3.0117  
MONTEREY-POINT REYES (EARTHQUAKE) - CALIFOR-  
NIA ...3.0120  
STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA  
...3.0126  
CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA,  
UTAH AND NEW MEXICO ...3.0127  
SEISMICITY AND EARTH STRUCTURE ...3.0167  
ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS  
...3.0220  
EARTHQUAKE DISTRIBUTION AND MECHANISM OF  
FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VAL-  
LEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA  
...3.0250  
MICROSEISMICITY AND TECTONICS OF THE NEVADA  
SEISMIC ZONE ...3.0258  
EXPERIMENTAL AND THEORETICAL STUDY OF THE  
DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE  
PREDICTION ...3.0260  
REGIONAL SEISMICITY AND TECTONICS OF THE  
SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH  
EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276  
SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
REGION ...3.0277  
A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE  
IN WESTERN WASHINGTON USING A SEISMIC  
TELEMETRY NETWORK ...3.0280  
REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA  
AND PENNSYLVANIA ...9.0002

##### *Geosynclines*

EARTHQUAKE HAZARDS REDUCTION-NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128

##### *Island Arcs*

THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES ...3.0146  
 SEISMICITY AND EARTH STRUCTURE ...3.0167  
 SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968 ...3.0241  
 A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262  
 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

#### *Mountains - Massifs*

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

#### *Ocean Basin Structure*

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128

#### *Salt Domes*

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015  
 DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE ...10.0022

#### *Volcanoes*

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES ...1.0009  
 A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262  
 HAWAIIAN VOLCANO OBSERVATORY ...14.0004  
 SEISMIC SURVEILLANCE OF AUGUSTINE REDOUBT AND SPURR VOLCANOES, COOK INLET, ALASKA ...14.0005  
 GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA ...14.0006  
 VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON ...14.0007

#### *Tectonics*

SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA ...3.0080  
 FAULT ZONE TECTONICS (CREEP) - CALIFORNIA ...3.0110  
 REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124  
 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA ...3.0133  
 STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA ...3.0138

TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180

A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE ...3.0236

MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE ...3.0258

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS ...3.0263

SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION ...3.0275

#### *Deformation*

RELATIVE ACTIVITY OF MULTIPLE FAULT STRANDS - CALIFORNIA ...3.0105

REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF BORREGO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (AB-BREV) ...3.0113

MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120

STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126

CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO ...3.0127

EARTHQUAKE HAZARDS REDUCTION--NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON ...3.0128

EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203

A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262

REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276

A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...3.0280

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...9.0031

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA ...16.0055

#### *Epirogenic Movement - isostasy*

ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA ...3.0175

#### *Igneous Activity - Volcanism*

GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA ...14.0006

REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII ...14.0014



- DREAS FAULT ...3.0155
- SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168
- ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS ...3.0220
- SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM ...3.0226
- SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES ...3.0261
- A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262
- GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA ...9.0029
- GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032
- Sea Floor Spreading*
- RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI ...3.0240
- MONTEREY BAY - CALIFORNIA ...9.0030
- Subsidence*
- SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197
- THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN ...3.0243
- DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING ...3.0284
- COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS ...10.0001
- DEVELOP METHODS FOR PREDICTING THE COMPONENTS OF GROUND MOVEMENT ABOVE MINE WORKINGS ...10.0005
- MICROSEISMIC DETERMINATION OF COAL MINE ENTRY STABILITY ...10.0006
- ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY ...10.0007
- STATUS OF LAND SUBSIDENCE DUE TO GROUND-WATER WITHDRAWAL IN MISSISSIPPI ...10.0008
- STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...10.0010
- LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011
- LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012
- ARIZONA EARTH FISSURE INVESTIGATION ...10.0014
- MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015
- LAND SUBSIDENCE STUDIES IN THE SAN JOAQUIN VALLEY - CALIFORNIA ...10.0019
- DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE ...10.0022
- ESTABLISH TECHNIQUES FOR MONITORING SURFACE SUBSIDENCE OVER MINED AREAS ...10.0023
- MEASUREMENT AND EVALUATION OF SUBSIDENCE OVER A COAL MINE WITH VARYING OVERBURDEN THICKNESS ...10.0024
- STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I ...10.0025
- RETURNING UNDERGROUND COAL MINE WASTES TO MINED-OUT VOIDS ...10.0026
- EARLY DETECTION AND CORRECTION OF SINKHOLE PROBLEMS - ALABAMA ...10.0027
- SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS ...10.0028
- REMOTE SENSING, ALAFIA AND PEACE RIVER BASINS, FLORIDA ...10.0029
- CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA ...10.0032
- URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...14.0003
- URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0025
- NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035
- GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA ...16.0055
- SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056
- Tectogenesis*
- MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT ...3.0155
- SAN FRANCISCO BAY ...15.0013
- Structural Studies**
- See Geophysics  
Seismology*
- Structural Testing**
- See Mechanics of Structures*

*See Techniques and Instrumentation  
Maps and Surveys*

## Structure Sites

*See Geomorphology  
Engineering Geology*

## Structures

*See Transportation Engineering  
Basic Studies*

## Sub - Humid

*See Climates*

## Sub-bottom Structure

*See Oceanography  
Marine Geology*

## Submarine Canyons

*See Oceanography  
Marine Geology*

## Submarine Faults

*See Oceanography  
Marine Geology*

## Subsidence

*See Structural Geology  
Tectonics*

## Subsurface Flow

*See Hydraulics  
Flow Types - Natural Water*

## Subsurface Stratigraphy

*See Stratigraphy*

POTENTIAL OF PRECIPITATION MODIFICATION IN  
MODERATE TO SEVERE DROUGHTS ...**2.0012**

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS.  
SOURI ...**6.0319**

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY  
...**6.0323**

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
& FLOOD INUNDATION - NEW JERSEY ...**6.0326**

URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUN.  
TY ...**6.0400**

## Sunshine

*See Meteorology*

## Supersonic Flight

*See Aeronautics and Aerodynamics  
Aircraft Flights*

## Support Structures

*See Mechanics of Structures*

## Surface Flow

*See Hydraulics  
Flow Types - Natural Water*

## Surface Water

*See Water Types*

## Surface Waves

*See Geophysics  
Seismology*

## Surveying

*See Transportation Engineering  
Basic Studies*

BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014

FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX  
FIRE - MINNESOTA ...5.0016

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY,  
NEW YORK STATE ...6.0333

SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS  
...10.0028

### Swelling - Shrinking

*See Soil Science and Mechanics*  
*Physical Properties*

### Synoptic Weather Observations

*See Meteorology*

### Synthetic Hydrology

*See Techniques and Instrumentation*

### Systems Analysis

*See Information Systems Research*  
*Economic Theory*  
*See Techniques and Instrumentation*

### Talus - Scree

*See Geomorphology*  
*Mass Wasting*

### Taxes

*See Economics*  
*Income Analysis*

### Technique Development

*See Techniques and Instrumentation*

### Techniques and Instrumentation

*See Also Meteorology*

### BIOLOGICAL OXYGEN DEMAND TEST

ANALYTICAL PHYSICAL MODEL ...8.0126

### BOREHOLE LOGGING

CRUSTAL DEFORMATION RELEASE, FAILURE AND  
TILTS IN ALASKA ...3.0070

ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

ROCK MECHANICS STUDY OF SHORTWALL MINING -  
KENTUCKY ...10.0007

LAND-SURFACE SUBSIDENCE, TEXAS CITY AND  
SEABROOK AREAS, TEXAS ...10.0012

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
...10.0015

SATELLITE VOLCANO SURVEILLANCE - ALASKA,  
HAWAII AND WASHINGTON ...14.0002

### CHEMICAL ANALYSIS

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

TRACER STUDIES IN THE NATIONAL HAIL RESEARCH  
EXPERIMENT (NHRE) ...7.0017

CONTINUING QUANTITATIVE GROUND-WATER STU-  
DIES IN THE HOUSTON DISTRICT ...10.0013

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

### COMPUTER METHODS

FIRE MANAGEMENT SYSTEMS ...5.0007

RUNOFF SIMULATION ...6.0156

GRAPHICAL DISPLAY OF HURRICANE FORECASTS  
...8.0090

COMPUTER SIMULATION OF SEVERE STORM OBSER-  
VATIONS WITH DOPPLER RADARS ...12.0041

LONG-PERIOD WAVES AND SURGES ...13.0019

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES -  
NEBRASKA (PROJECT 20/20) ...16.0014

DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMER-  
GENCY MEDICAL CARE IN THE METROPOLITAN

MONTEREY BAY - CALIFORNIA ...3.0116  
 ENGINEERING GEOLOGY - ILLINOIS ...9.0011  
 ROCK MECHANICS STUDY OF SHORTWALL MINING -  
 KENTUCKY ...10.0007  
 LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
 ...10.0011  
 MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA  
 ...10.0015  
 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
 STUDY THE EXTENT, MAGNITUDE R ...10.0018

#### DATA ACQUISITION

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF  
 FEBRUARY 9, 1971 ...3.0017  
 NATIONAL INFORMATION SERVICE FOR EARTHQUAKE  
 ENGINEERING, SAN FERNANDO DATA PROCESSING  
 ...3.0042  
 RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
 WATER ...3.0100  
 PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN  
 7-1/2-MINUTE QUADRANGLES AND VICINITY,  
 CALIFORNIA ...3.0121  
 AUTOMATIC MICROEARTHQUAKE PROCESSING -  
 CALIFORNIA ...3.0129  
 ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BUL-  
 LETIN, MARCH 1972 ...3.0223  
 ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BUL-  
 LETIN, MARCH 1971 ...3.0224  
 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
 CURRENCE OF FRESH GROUND WATER IN POST-  
 OLIGOCENE DEPOSITS OF THE GULF COASTAL  
 PLAIN ...3.0243  
 SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
 REGION ...3.0277  
 ELEMENTS OF THE WATER RESOURCES SITUATION IN  
 ALABAMA ...6.0035  
 EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
 ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039  
 FLOODS FROM SMALL DRAINAGE AREAS IN CALIFOR-  
 NIA ...6.0043  
 SOUTH COASTAL BASIN PRECIPITATION FREQUENCY -  
 A REGIONAL ANALYSIS OF DEPTH-DURATION  
 FREQUENCY OF SHORT-DURATION PRECIPITATION  
 IN CALIFORNIA ...6.0044  
 FLOOD FREQUENCY IN URBAN AREAS, COLORADO  
 ...6.0048  
 INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060  
 COLLECTION AND ANALYSIS OF STREAM FLOW AND  
 RELATED HYDRAULIC DATA FOR DESIGN OF  
 HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR  
 SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132  
 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
 NORTH CAROLINA ...6.0135  
 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
 NORTH CAROLINA ...6.0136

COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
 ...6.0148  
 DEVELOPMENT OF AERIAL MEASUREMENT  
 TECHNIQUES ...6.0165  
 PERRIS VALLEY URBAN HYDROLOGY STUDY,  
 CALIFORNIA ...6.0168  
 FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
 ...6.0187  
 HYDROLOGY OF SMALL WATERSHEDS ...6.0190  
 LAKE HYDROLOGY ...6.0207  
 HYDROLOGY OF OUTSTANDING FLOODS ...6.0211  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
 GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
 DAKOTA ...6.0219  
 HYDROLOGIC RELATIONS IN HAWAII ...6.0247  
 FLOOD FREQUENCY STUDY ILLINOIS ...6.0256  
 THE EFFECT OF URBANIZATION ON HYDROLOGY OF  
 WATERSHEDS - INDIANA ...6.0270  
 FLOOD PROFILES AND FLOOD-PLAIN INFORMATION  
 FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR  
 FALLS, IOWA ...6.0277  
 FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
 CEDAR RAPIDS, IOWA ...6.0279  
 DATA AND MANAGEMENT NEEDS FOR WATER RE-  
 LATED LAND AREAS - MAINE ...6.0288  
 CLIMATES OF THE STATES - CLIMATE OF NEW YORK  
 ...6.0289  
 CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
 STUDY ...6.0310  
 HYDROLOGY OF STREAMS IN ST. LOUIS  
 METROPOLITAN AREA ...6.0317  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGAN-  
 TON, NORTH CAROLINA ...6.0343  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
 STREAMS - NORTH DAKOTA ...6.0344  
 APPLICATION OF COST-EFFECTIVENESS TO THE  
 DESIGN OF A FLOOD PLAIN ...6.0346  
 APPRAISAL OF THE WATER AND RELATED LAND  
 RESOURCES OF OKLAHOMA ...6.0351  
 SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESER-  
 VOIR ...6.0360  
 INVESTIGATION OF THE MAGNITUDE AND FREQUEN-  
 CY OF FLOODS ON SMALL STREAMS IN TENNESSEE  
 ...6.0371  
 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372  
 HYDROLOGIC STUDIES OF SMALL RURAL TEXAS  
 WATERSHEDS ...6.0375  
 URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382  
 URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS  
 ...6.0383  
 URBAN HYDROLOGY STUDY - DALLAS COUNTY,  
 TEXAS ...6.0384  
 TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND  
 USE MANAGEMENT OF FLOOD PLAINS ...6.0394  
 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX  
 COUNTY, VIRGINIA ...6.0395

KENTUCKY ...10.0007  
 LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012  
 ESTABLISH TECHNIQUES FOR MONITORING SURFACE SUBSIDENCE OVER MINED AREAS ...10.0023  
 TSUNAMI RESEARCH ...13.0005  
 EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA ...13.0012  
 SATELLITE VOLCANO SURVEILLANCE - ALASKA, HAWAII AND WASHINGTON ...14.0002  
 COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA ...15.0015  
 COMMUNICATIONS IN NATURAL DISASTERS ...16.0033  
 PLAN TO IMPROVE LOCAL WEATHER FORECASTS ...16.0072

#### *Automatic Data Acquisition*

FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102  
 HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297  
 FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389

#### *Data Networks*

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049  
 FLOOD FLOWS FROM SMALL DRAINAGE AREAS ...6.0058  
 PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
 HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA ...6.0069  
 FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075  
 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079  
 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082  
 STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090  
 FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091  
 FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094  
 FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102  
 HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE ...6.0103

HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149  
 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169  
 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186  
 SMALL STREAM FLOOD CHARACTERISTICS ...6.0193  
 DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233  
 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234  
 SPECIAL FLOOD DATA COLLECTION, HAWAII ...6.0249  
 FLOOD PLAIN MAPPING IN HAWAII ...6.0250  
 SPECIAL FLOOD DATA COLLECTION - HAWAII ...6.0251  
 FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS ...6.0261  
 CITY OF JACKSON WATER RESOURCES STUDY ...6.0311  
 DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316  
 STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318  
 HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349  
 FLOOD PLAIN INUNDATION ...6.0364  
 FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366  
 URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392  
 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
 STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415  
 CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT ...10.0013

DROUGHT STUDY OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018  
 METEOROLOGICAL DROUGHT IN TENNESSEE ...2.0024  
 NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING ...3.0042  
 RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER ...3.0100  
 MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104  
 ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118  
 MICROEARTHQUAKE DATA ANALYSIS ...3.0119  
 SEISMIC SOURCE STUDIES - CALIFORNIA ...3.0130  
 TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA ...3.0131  
 CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135  
 AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157  
 RISK MAPS AND FIELD INVESTIGATIONS ...3.0163  
 SEISMICITY AND EARTH STRUCTURE ...3.0167  
 NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE ...3.0174  
 V. A. HOSPITAL SITE EVALUATIONS ...3.0177  
 EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971 ...3.0246  
 FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023  
 FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034  
 RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049  
 FLOOD FLOWS FROM SMALL DRAINAGE AREAS ...6.0058  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO ...6.0059  
 CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074  
 FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075  
 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0076  
 INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS ...6.0078  
 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079  
 STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090

BRIDGE STUDY IN TENNESSEE ...6.0132  
 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134  
 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135  
 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136  
 STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139  
 FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS ...6.0146  
 RUNOFF SIMULATION ...6.0156  
 FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176  
 FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187  
 SMALL STREAM FLOOD CHARACTERISTICS ...6.0193  
 HYDROLOGY OF OUTSTANDING FLOODS ...6.0211  
 WATER RESOURCES INVESTIGATIONS ...6.0216  
 INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0217  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222  
 THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242  
 EVALUATION OF FLOOD RISKS ...6.0264  
 THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270  
 FLOOD PROFILES OF IOWA STREAMS ...6.0274  
 FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA ...6.0278  
 EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282  
 FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301  
 HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319  
 FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327  
 FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342  
 SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR ...6.0360  
 FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366  
 FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370  
 INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

FLOOD INVESTIGATIONS IN WYOMING ...6.0414

OBJECTIVE ANALYSIS OF THE SEA SURFACE TEMPERATURE ...8.0129

LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012

CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT ...10.0013

MORPHOLOGY OF TWO TORNADIC STORMS - AN ANALYSIS OF NSSL DATA ON APRIL 30, 1970 - OKLAHOMA CITY, OKLAHOMA ...12.0007

EM RADIATION-TORNADOES ...12.0027

STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032

EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA ...13.0012

SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA ...15.0039

WEATHER AND CLIMATE MODIFICATION - PROBLEMS AND PROGRESS ...16.0063

#### DRILLING

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME II, APPENDICES ...6.0040

ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY ...10.0007

VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLGY INVESTIGATIONS - SOILS PHASE) ...10.0030

SHORE EROSION STUDY OF ERIE COUNTY, OHIO ...15.0030

SHORE EROSION STUDY OF LAKE COUNTY, OHIO ...15.0031

#### FIELD STUDIES

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA ...3.0039

HURRICANE MODIFICATION ...8.0057

SEA-AIR INTERACTION LABORATORY OPERATIONS ...8.0065

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING ...9.0035

SHORE EROSION STUDY OF LAKE COUNTY, OHIO ...15.0031

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA ...16.0055

WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971 ...16.0090

#### FLUME STUDIES

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085

INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES ...6.0189

#### FORECASTING - PREDICTION

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION ...1.0005

AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT ...1.0006

DEVELOPMENT OF METHODOLOGY FOR EVALUATION AND PREDICTION OF AVALANCHE HAZARD IN THE SAN JUAN MOUNTAINS OF COLORADO ...1.0008

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

SNOW PACK STABILITY INDICES RELATIVE TO THE CLIMAX AVALANCHE ...1.0013

AVALANCHE CONTROL IMPLEMENTATION STUDY ...1.0014

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007

DROUGHT IN KANSAS ...2.0013

THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018

DROUGHT AND WET SPELLS IN NORTH DAKOTA ...2.0020

DROUTH PROBABILITIES IN TENNESSEE ...2.0023

COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION ...3.0008

STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES ...3.0028

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047) ...3.0065

MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS ...3.0093

- INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA ...3.0117
- ENGINEERING SEISMOLOGY - CALIFORNIA ...3.0118
- MICROEARTHQUAKE DATA ANALYSIS ...3.0119
- MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120
- STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA ...3.0126
- CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO ...3.0127
- AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA ...3.0129
- TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA ...3.0131
- CALIFORNIA M/EQ NET ...3.0134
- CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA ...3.0135
- EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA ...3.0153
- AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA ...3.0157
- ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159
- RISK MAPS AND FIELD INVESTIGATIONS ...3.0163
- SOUTH CAROLINA SEISMICITY PROGRAM ...3.0168
- TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH ...3.0180
- EARTHQUAKE EFFECTS ON STRUCTURES ...3.0203
- SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM ...3.0226
- MAGNITUDE RECURRENCE RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES ...3.0237
- PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA-GLLENDALE AREA ...3.0244
- EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION ...3.0260
- SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES ...3.0261
- A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA ...3.0262
- SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES ...3.0268
- REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH ...3.0276
- PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...5.0002
- NATIONAL FIRE DANGER RATING ...5.0027
- FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023
- STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031
- WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS ...6.0036
- ESSA AND OPERATION FORESIGHT ...6.0057
- INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060
- ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071
- WATER WARNINGS AND SPECIALIZED FORECASTS ...6.0081
- FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082
- OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS ...6.0086
- FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102
- HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE ...6.0103
- DESIGN OF OPTIMAL PRECIPITATION NETWORKS ...6.0107
- FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113
- APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT ...6.0125
- FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS ...6.0145
- HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149
- OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150
- DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL ...6.0163
- SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182
- PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186
- LAKE HYDROLOGY ...6.0207
- INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212
- FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0214
- WATER RESOURCES INVESTIGATIONS ...6.0216
- IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS ...6.0218
- INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0219
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222
- A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES ...6.0224



- GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230
- HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234
- TRAVEL TIME OF GEORGIA STREAMS ...6.0241
- SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246
- FLOOD FREQUENCY STUDY ILLINOIS ...6.0256
- RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259
- EVALUATION OF FLOOD RISKS ...6.0264
- PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN ...6.0299
- FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301
- MISSISSIPPI BASIN MODEL ...6.0313
- DEMONSTRATION OF THE ELECTRIC ANALOG MODEL OF THE KANSAS RIVER AT THE UNIVERSITY OF CALIFORNIA IN BERKELEY ...6.0314
- EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY ...6.0322
- STREAMS AND DRAINAGE BASINS - FULTON COUNTY, NEW YORK ...6.0329
- AN EVALUATION OF HURRICANE AGNES FLOODS IN COMPARISON TO BRIDGE DESIGN INFORMATION AVAILABLE FOR PENNSYLVANIA CONTEMPORANEOUSLY ...6.0355
- COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356
- URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373
- RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS ...6.0388
- FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION ...6.0391
- MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392
- FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON ...6.0403
- FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON ...6.0404
- FLOOD HAZARD INFORMATION - BUFFALO CREEK, LOGAN COUNTY, WEST VIRGINIA POST-DISASTER CONDITIONS ...6.0405
- THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS ...6.0413
- APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL
- BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO ...8.0106
- MARINE ENVIRONMENTAL PREDICTION ...8.0113
- SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA ...8.0133
- DEVELOPING REMOTE SENSING TECHNIQUES FOR AIDING PREDICTION OF LANDSLIDES ...9.0058
- DEVELOP METHODS FOR PREDICTING THE COMPONENTS OF GROUND MOVEMENT ABOVE MINE WORKINGS ...10.0005
- ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY ...10.0007
- VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLOGY INVESTIGATIONS - SOILS PHASE) ...10.0030
- TSUNAMI RESEARCH ...13.0005
- NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES ...13.0016
- LONG-PERIOD WAVES AND SURGES ...13.0019
- TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY ...13.0028
- GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA ...14.0006
- EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...15.0029
- SEISMIC HAZARDS AND LAND-USE PLANNING ...16.0074
- GAGING
- THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY ...2.0018
- FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034
- PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061
- FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA ...6.0075
- FLOOD-FREQUENCY STUDY - KENTUCKY ...6.0093
- BRIDGE SITE INVESTIGATIONS ...6.0114
- SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115
- TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN ...6.0143
- FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS ...6.0146
- HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149
- FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161
- FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS

DRAINAGE BASINS IN IDAHO ...6.0254  
 DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS ...6.0255  
 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276  
 EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282  
 HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323  
 THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357  
 FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365  
 FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386

#### *Water Level Recorders*

FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO ...6.0020  
 FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA ...6.0043  
 SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-DURATION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA ...6.0044  
 FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048  
 FLOOD FLOWS FROM SMALL DRAINAGE AREAS ...6.0058  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO ...6.0059  
 COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064  
 ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071  
 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079  
 FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094  
 FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140  
 FLOOD INVESTIGATIONS - TENNESSEE ...6.0147  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186  
 SMALL STREAM FLOOD CHARACTERISTICS ...6.0193

FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS ...6.0261  
 EVALUATION OF FLOOD RISKS ...6.0264  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
 FLOOD PROFILES OF IOWA STREAMS ...6.0274  
 CITY OF JACKSON WATER RESOURCES STUDY ...6.0311  
 HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317  
 HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319  
 FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY ...6.0325  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349  
 FLOOD PLAIN INUNDATION ...6.0364  
 INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392  
 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
 LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011  
 CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT ...10.0013  
 LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R ...10.0018

#### *Water Motion Recorders*

STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090  
 FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140  
 INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA ...6.0212  
 DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220  
 FLOOD PROFILES OF IOWA STREAMS ...6.0274  
 FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349  
 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414

### Water Volume Records

PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049

FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA ...6.0062

FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091

FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094

FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102

FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106

INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140

FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180

FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187

WATER RESOURCES INVESTIGATIONS ...6.0216

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220

FLOOD PLAIN MAPPING IN HAWAII ...6.0250

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318

FLOOD PLAIN INUNDATION ...6.0364

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366

INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS ...6.0388

STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415

### GEOCHRONOLOGY

SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS -

VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON ...14.0007

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL IDAHO ...14.0012

### GEOPHYSICAL ANALYSIS

REGIONAL GEOLOGICAL FRAMEWORK, NORTH CENTRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108

MONTEREY BAY - CALIFORNIA ...9.0030

### HEAVY MINERAL ANALYSIS

EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST ...6.0341

### IN SITU TECHNIQUES

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION ...1.0005

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA ...15.0017

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

### INFRARED TECHNIQUES

THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY ...5.0030

APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES ...6.0165

### LABORATORY ANALYSIS

EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION ...3.0260

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT ...5.0033

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085

INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES ...6.0189

SEA-AIR INTERACTION LABORATORY OPERATIONS ...8.0065

COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE PROTECTION FOR EARTH EMBANKMENTS ...9.0025

ROCK STRENGTH FROM FAILURE CASES ...9.0054

*Bench Leveling*

STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

*Slope Stabilization*

UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
...6.0196

THE USE OF GRASSES FOR DUNE STABILIZATION  
ALONG THE GULF COAST WITH INITIAL EMPHASIS  
ON THE TEXAS COAST ...8.0049

## LYSIMETERS

FIRE ON A FOREST SOIL ...5.0047

## MAPS AND SURVEYS

THE DETERMINATION OF THE FREQUENCY OF  
DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY  
AND DURATION - NEW JERSEY ...2.0018

VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
...3.0006

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS  
...3.0010

SEISMIC RISK - FDAA - WASHINGTON AND UTAH  
...3.0020

OPTIMIZATION OF WATER RESOURCE SYSTEMS IN  
INCORPORATING EARTHQUAKE RISK ...3.0102

EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO  
BAY REGION ...3.0107

ENG AFTERSHOCK STUDIES - CALIFORNIA ...3.0159

RESEARCH STUDIES AND REPORTS ON EARTHQUAKE  
HAZARDS REDUCTION ...3.0218

SEISMIC RISK STUDIES IN THE UNITED STATES ...3.0219

THE RELATION BETWEEN FELT AREA AND MAGNITUDE  
FOR CENTRAL UNITED STATES EARTHQUAKES ...3.0238

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE  
OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS  
OF THE GULF COASTAL PLAIN ...3.0243

TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC  
METHODS ...3.0263

MAPPING OF SURFACE MATERIALS FOR PREDICTING  
FOUNDATION CHARACTERISTICS IN FUTURE  
DEVELOPMENT OF HATTIESBURG ...4.0009

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER  
VALLEY ...6.0121

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL  
MODIFICATIONS ASSUMING TOTAL  
METROPOLITAN DEVELOPMENT IN DRAINAGE  
BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION  
TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209

IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS  
...6.0218

NATURAL DISASTER ANALYSIS FOR LATAH COUNTY,  
IDAHO, JUNE 1973 ...6.0253

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES,  
MACON COUNTY, ILLINOIS ...6.0258

FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS  
...6.0261

PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT  
CRITERIA FOR RED RIVER OF THE NORTH ABOVE  
PEMBINA AND SOURIS RIVER ABOVE MINOT,  
NORTH DAKOTA ...6.0290

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK  
ON TEN TASKS ...6.0298

FLOOD PLAIN STUDIES--MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA  
RIVER ...6.0305

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
STUDY ...6.0310

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN  
AREA ...6.0317

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND  
100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT  
VALLEY, MONTANA ...6.0321

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY  
...6.0323

FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY  
...6.0325

STREAMS AND DRAINAGE BASINS - FULTON COUNTY,  
NEW YORK ...6.0329

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR  
REVISION AND EXPANSION ...6.0330

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION -  
VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA,  
N.Y. ...6.0332

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE,  
NORTH CAROLINA ...6.0342

APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA ...6.0351

FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP  
AND TILLAMOOK COUNTIES, OREGON - 1972-1973  
...6.0352

FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE  
TO LOCAL GOVERNMENT ...6.0398

FLOOD HAZARD INFORMATION - BUFFALO CREEK,  
LOGAN COUNTY, WEST VIRGINIA POST-DISASTER  
CONDITIONS ...6.0405

LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
STUDY THE EXTENT, MAGNITUDE R ...10.0018

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

EARLY DETECTION AND CORRECTION OF SINKHOLE  
PROBLEMS - ALABAMA ...10.0027

REMOTE SENSING, ALAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

TORNADO INCIDENCE MAPS ...12.0008

NATIONAL SEVERE LOCAL STORMS OPERATIONS  
PLAN ...12.0012

THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS  
...13.0025

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

VOLCANIC HAZARDS, ISLAND OF HAWAII ...14.0010

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN  
ORIENT POINT AND PORT JEFFERSON HARBOR  
...15.0028

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF  
LAKE ERIE ...15.0032

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS  
COASTAL ZONE, GALVESTON-HOUSTON AREA  
...16.0104

#### *Charts*

DROUTH PROBABILITIES IN TENNESSEE ...2.0023

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394

OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERA-  
TURES (SST) ...8.0087

CIRCULATION FEATURES OF TROPICAL CYCLONES  
...8.0088

STATISTICAL-DYNAMICAL PREDICTION OF HUR-  
RICANE TRACKS ...8.0091

#### *Geologic Maps*

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039

HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES  
...3.0056

CALIFORNIA ...3.0121

EARTHQUAKE HAZARDS REDUCTION-NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128

GREATER ANCHORAGE AREA BOROUGH, ALASKA  
...3.0172

DENVER METROPOLITAN AREA, COLORADO ...3.0176

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL -  
IDAHO ...3.0181

HAMILTON 2 DEGREE ...3.0184

SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197

COMPILATION OF BRITTLE STRUCTURES WITHIN NEW  
YORK STATE ...3.0256

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...4.0004

FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS ...6.0145

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

MONTEREY BAY - CALIFORNIA ...9.0030

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO  
...9.0040

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...9.0043

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

ALASKA GEOLOGIC EARTHQUAKE HAZARDS ...13.0013

ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU  
TO WILMINGTON, CALIFORNIA ...13.0014

VOLCANIC HAZARDS IN THE CASCADE RANGE -  
CALIFORNIA AND WASHINGTON ...14.0007

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
...15.0023

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

#### *Geologic Sections*

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039

REGIONAL GEOLOGICAL FRAMEWORK, NORTH CEN-  
TRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108

COAL MINE DEFORMATION STUDIES, SOMERSET,  
COLORADO ...10.0004  
MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...10.0031

#### *Reconnaissance Maps*

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100  
EARTHQUAKE HAZARDS REDUCTION--NORTHWEST  
AND GEOLOGY OF THE NORTHWESTERN OLYMPIC  
PENINSULA, WASHINGTON ...3.0128  
SEISMICITY INVESTIGATIONS IN THE CASCADE MOUN-  
TAINS AND VICINITY, OREGON, 1 MAY 1969 - 30  
APRIL 1970 ...3.0266  
HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS-  
SOURI ...6.0319  
EFFECTS OF HURRICANE CAMILLE ON THE LAND-  
SCAPE OF THE BRETON-CHANDELEUR ISLAND  
CHAIN AND THE EASTERN PORTION OF THE LOWER  
MISSISSIPPI DELTA ...8.0008  
NATIONAL HURRICANE OPERATION PLAN ...8.0020  
ENGINEERING GEOLOGY RECONNAISSANCE STUDIES  
OF COASTAL COMMUNITIES, ALASKA ...10.0021  
RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
SITKA AREA, ALASKA ...13.0018  
THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
GRAM - WASHINGTON, OREGON AND CALIFORNIA  
...14.0008  
EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC  
FACTORS INFLUENCING EROSION OF THE OREGON  
COAST ...15.0033

#### *Soil Maps*

FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS ...6.0145  
NEW TECHNIQUES FOR DELINEATION OF FLOOD  
PLAIN HAZARD ZONES - SOIL SURVEYS ...6.0411  
REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

#### *Structure Contour Maps*

REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS  
FAULT - CALIFORNIA ...3.0039  
REGIONAL GEOLOGICAL FRAMEWORK, NORTH CEN-  
TRAL SAN ANDREAS FAULT - CALIFORNIA ...3.0108  
SOUTHERN CALIFORNIA TECTONICS ...3.0112  
SNAKE RIVER BASIN, PART F - SOUTHERN PART,  
NORTHWEST MARGIN - IDAHO ...3.0182  
COMPILATION OF BRITTLE STRUCTURES WITHIN NEW  
YORK STATE ...3.0256  
AGE, GEOMETRY, AND STRESS FIELDS OF FOUR  
MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE  
RANGES BY EVALUATION OF WELL DATA ...3.0264

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394  
URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUN-  
TY ...6.0400  
FLOOD INUNDATION STUDY, WISCONSIN ...6.0409  
LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

#### *MATHEMATICAL ANALYSIS*

SEVERITY AND FREQUENCY OF DROUGHT IN MISSIS-  
SIPPI ...2.0015  
COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGET-  
ING FOR EARTHQUAKE HAZARD MITIGATION  
...3.0008  
STUDIES OF GROUND MOTIONS IN LOCAL  
EARTHQUAKES ...3.0028  
EARTHQUAKE RESPONSE OF CONCRETE GRAVITY  
DAMS ...3.0031  
SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE  
RESPONSE ANALYSIS OF HORIZONTALLY LAYERED  
SITES ...3.0035  
IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN  
...3.0038  
STABILITY AND DYNAMIC RESPONSE OF COOLING  
TOWERS ...3.0068  
ADAP - A COMPUTER PROGRAM FOR STATIC AND  
DYNAMIC ANALYSIS OF ARCH DAMS ...3.0077  
OPTIMIZATION OF WATER RESOURCE SYSTEMS IN-  
CORPORATING EARTHQUAKE RISK ...3.0102  
APPLICATION OF PROBABILITY, STATISTICS AND DEC-  
ISION THEORY IN SOIL ENGINEERING ...3.0137  
ANALYSIS OF LIQUEFACTION OF SATURATED GRANU-  
LAR SOILS DURING EARTHQUAKES ...3.0209  
NONLINEAR AND COUPLED SEISMIC EFFECTS ...3.0228  
EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES  
IN EARTH DAMS ...3.0231  
MAGNITUDE RECURRENCE RELATION FOR CENTRAL  
MISSISSIPPI VALLEY EARTHQUAKES ...3.0237  
THE RELATION BETWEEN FELT AREA AND MAG-  
NITUDE FOR CENTRAL UNITED STATES  
EARTHQUAKES ...3.0238  
A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN  
EARTHQUAKE ENGINEERING ...3.0252  
SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN  
REGION ...3.0277  
SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN  
AND WALL CONNECTIONS ...3.0282  
FIRE MANAGEMENT SYSTEMS ...5.0007  
FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023  
FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS  
- ALABAMA ...6.0034  
RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL  
...6.0038

- FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091
- FLOOD-FREQUENCY STUDY - KENTUCKY ...6.0093
- FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106
- DESIGN OF OPTIMAL PRECIPITATION NETWORKS ...6.0107
- OPTIMIZATION OF OPERATION OF A SYSTEM OF FLOOD CONTROL RESERVOIRS ...6.0123
- APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT ...6.0125
- EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136
- MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138
- STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140
- OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS ...6.0144
- FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS ...6.0146
- FLOOD INVESTIGATIONS - TENNESSEE ...6.0147
- HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149
- OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150
- RUNOFF SIMULATION ...6.0156
- STOCHASTIC HYDROLOGY ...6.0167
- FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176
- WATER RESOURCES INVESTIGATIONS ...6.0216
- IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237
- TRAVEL TIME OF GEORGIA STREAMS ...6.0241
- SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251
- MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO ...6.0254
- RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259
- STREAMFLOW VARIABILITY - ILLINOIS ...6.0263
- EVALUATION OF FLOOD RISKS ...6.0264
- THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270
- FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA ...6.0278
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297
- FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA ...6.0321
- DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326
- THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328
- EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342
- EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343
- STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348
- COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356
- EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA ...6.0361
- INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366
- INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371
- EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374
- TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING ...6.0378
- VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS ...6.0387
- MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392
- NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396
- URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400
- URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401
- THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA ...7.0016
- CIRCULATION FEATURES OF TROPICAL CYCLONES ...8.0088
- STATISTICAL-DYNAMICAL PREDICTION OF HURRICANE TRACKS ...8.0091
- ERROR ANALYSIS OF HURRICANE FORECASTS ...8.0092
- NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...8.0125
- ANALYTICAL PHYSICAL MODEL ...8.0126
- STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS ...9.0012
- PROBABILISTIC MODELING OF EXTREME LOADS ...12.0035
- TSUNAMI RESEARCH ...13.0005
- RECENT TSUNAMI THEORY ...13.0023

AND PROGRESS ...6.0005  
AN ANALYSIS OF OPERATING SYSTEM EFFECTIVENESS  
- FOCUS ON THE BEHAVIOR OF LOCAL COORDINATORS ...6.0085

## MEASUREMENTS & MEASURING

### *Acceleration*

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF  
MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040

### *Mass*

QUASI-STATIC LATERAL DESIGN LOADS FOR  
EARTHQUAKE RESISTANT STRUCTURES ...3.0058

### *Measuring Devices*

WAVE AND SURGE CONDITIONS AFTER PROPOSED EX-  
PANSION OF MONTEREY HARBOR, MONTEREY,  
CALIFORNIA - HYDRAULIC MODEL INVESTIGATION  
...8.0041

EARTHWORK REINFORCEMENT TECHNIQUES - LOS AN-  
GELES AREA ...9.0005

LANDSLIDES - KENTUCKY ...9.0015

ESTABLISH TECHNIQUES FOR MONITORING SURFACE  
SUBSIDENCE OVER MINED AREAS ...10.0023

### *Pressure*

EARTH AND ROCKFILL DAM DESIGN PRACTICES  
...3.0171

LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS  
...10.0011

### *Vibration*

MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF  
MULTISTORY BUILDINGS IN CALIFORNIA ...3.0040

STRUCTURAL MODEL TESTS OF EARTHQUAKE EF-  
FECTS (ES 047) ...3.0065

## MODEL STUDIES

ECONOMIC EVALUATION OF USE AND DEVELOPMENT  
OF WATER AND LAND RESOURCES ...2.0017

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

SEISMICITY AND EARTH STRUCTURE ...3.0167

SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW  
THEORIES OF TECTONICS AND EARTHQUAKE  
MECHANISM ...3.0226

EXPERIMENTAL AND THEORETICAL STUDY OF THE  
DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE  
PREDICTION ...3.0260

EARTHQUAKE RISK EVALUATION - CRITTENDEN  
COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI,  
AND SHELBY COUNTY, TENNESSEE ...3.0269

MECHANISMS OF WILDLAND FIRE SUPPRESSION  
...5.0024

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN  
AN URBAN AREA - PHASE III ...6.0073

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN  
FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
...6.0074

URBAN HYDROLOGY AND URBAN WATER RESOURCES  
OF THE ISLAND OF OAHU, HAWAII ...6.0076

FLOOD HYDROLOGY AND URBAN WATER RESOURCES  
OF THE ISLAND OF OAHU, HAWAII ...6.0077

INITIAL RESULTS FROM THE UPPER WABASH SIMULA-  
TION MODEL ...6.0088

FLOOD INVESTIGATIONS - HIGHWAY COMMISSION -  
KANSAS ...6.0091

FLOOD PROOFING DECISIONS UNDER UNCERTAINTY -  
AN APPLICATION TO THE CONNECTICUT RIVER  
BASIN ...6.0105

INVESTIGATION AND ANALYSIS OF FLOODS FOR  
SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF  
WATER RESOURCES MANAGEMENT PLANS FOR NEW  
YORK STATE - ADDENDUM ...6.0131

INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL WATERSHEDS IN OKLAHOMA ...6.0140

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC  
FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153

DEVELOPMENT OF AN ALASKAN CONCEPTUAL  
WATERSHED MODEL ...6.0163

THE IMPACT OF URBANIZATION ON WATER YIELD,  
FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALI-  
TY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

URBAN HYDROLOGY OF POWAY VALLEY, CALIFOR-  
NIA ...6.0169

SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT,  
EAST TWIN AND WARM CREEK IMPROVEMENT  
...6.0172

PLAN FORMULATION AND EVALUATION IN MULTIPLE  
PURPOSE WATER RESOURCE PROJECT - A  
FRAMEWORK FOR REGIONAL PLANNING (ABBREV)  
...6.0175

FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL  
DRAINAGE AREAS - VIRGINIA ...6.0180

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN OR-  
DINANCE ...6.0235

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN OR-  
DINANCE, MARCH, 1972 ...6.0236

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RE-  
SIDENT ATTITUDES AND PERCEPTIONS AND THEIR  
IMPLICATIONS TO FLOOD PLAIN MANAGEMENT  
POLICY ...6.0239

HAWAII ENVIRONMENTAL SIMULATION MODEL  
...6.0252



DEVELOPMENT OF AN EFFECTIVE TECHNICAL  
PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN  
MANAGEMENT PROGRAM ...6.0347

THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA ...6.0357

INVESTIGATION OF THE MAGNITUDE AND FREQUEN-  
CY OF FLOODS ON SMALL STREAMS IN TENNESSEE  
...6.0371

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394

PILOT STUDY OF FLOOD PLAIN MANAGEMENT -  
WASHINGTON ...6.0402

REMOTE SENSING FOR RESOURCE MANAGEMENT AND  
FLOOD PLAIN DELINEATION ...6.0412

REGIONAL CODE ENFORCEMENT - HANCOCK, HAR-  
RISON AND JACKSON COUNTIES, MISSISSIPPI ...8.0010

TEXAS COAST HURRICANE SURGE MODEL STUDIES  
...8.0013

TROPICAL METEOROLOGIC PROBLEMS ...8.0058

HURRICANE-OCEAN INTERACTION ...8.0064

STUDIES OF CUMULUS HEATING AND THE CISK  
MECHANISM ...8.0067

BAROTROPIC PREDICTION OF HURRICANE TRACKS  
...8.0093

PROJECT STORMFURY ANNUAL REPORT 1971 ...8.0095

STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN  
...11.0005

HURRICANE SPAWNED TORNADOES ...12.0028

A REVIEW OF THE EXPERIMENTAL DATA RELATIVE  
TO THE PILOT MODEL STUDY FOR THE DESIGN OF  
HILO HARBOR TSUNAMI MODEL ...13.0027

EASTERN SNAKE RIVER PLAIN REGION INVESTIGA-  
TIONS - HAWAII ...14.0011

REGIONAL VOLCANOLOGY - WESTERN UNITED  
STATES INCLUDING ALASKA AND HAWAII ...14.0014

SEISMIC HAZARDS AND LAND-USE PLANNING ...16.0074

#### *Computer Models*

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

RANGELY - CALIFORNIA ...3.0123

CENTRAL CALIFORNIA SEISMICITY STUDIES -  
CALIFORNIA ...3.0135

DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL  
SYSTEMS ...3.0255

AN OPTIMUM WATER ALLOCATION MODEL BASED ON  
AN ANALYSIS FOR THE KISSIMEE RIVER BASIN -  
FLORIDA ...6.0066

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN  
GEORGIA ...6.0075

CLOUD SEEDING POTENTIAL FOR TWELVE RIVER  
BASINS ...6.0171

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN  
DEVELOPMENT - PART II - MODEL DESCRIPTION  
AND APPLICATIONS ...6.0173

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN  
DEVELOPMENT - PART I - LAND USE PLANNING AND  
BENEFIT EVALUATION ...6.0174

PEAK DISCHARGE AND FREQUENCY FOR SMALL  
WATERSHEDS IN COLORADO ...6.0186

HYDROGRAPH MODEL STUDIES OF THE HILL-  
SBOROUGH, ALABAMA, AND ANCLOTE RIVER BASINS,  
FLORIDA ...6.0234

WABASH RIVER SYSTEMS MODELS FOR PROJECT  
MANAGEMENT, PLANNING AND EVALUATION  
...6.0271

EFFECT OF URBANIZATION ON FLOOD RUNOFF -  
WICHITA AREA ...6.0282

OPSET - PROGRAM FOR COMPUTERIZED SELECTION  
OF WATERSHED PARAMETER VALUES FOR THE  
STANFORD WATERSHED MODEL ...6.0285

LEGAL FACTORS IN ECONOMETRIC MODELING OF  
LOCAL FLOODPLAIN MANAGEMENT DEVICES IN  
THE CONNECTICUT RIVER BASIN ...6.0294

FLOOD PLAIN STUDIES-MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MIN-  
NESOTA RIVER ...6.0305

DEMONSTRATION OF THE ELECTRIC ANALOG MODEL  
OF THE KANSAS RIVER AT THE UNIVERSITY OF  
CALIFORNIA IN BERKELEY ...6.0314

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER  
RESOURCE SYSTEMS - VOLUME IV - MODELS FOR  
MANAGING METROPOLITAN SURFACE WATER  
SYSTEMS ...6.0335

STREAMFLOW SIMULATION AND FLOOD PROFILE  
DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

FLOOD FREQUENCY OF SMALL AREAS - SOUTH  
CAROLINA ...6.0365

INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
DAKOTA ...6.0366

URBAN HYDROLOGY STUDY - DALLAS COUNTY,  
TEXAS ...6.0384

STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

CIRCULATION FEATURES OF TROPICAL CYCLONES  
...8.0088

GRAPHICAL DISPLAY OF HURRICANE FORECASTS  
...8.0090

STATISTICAL-DYNAMICAL PREDICTION OF HUR-  
RICANE TRACKS ...8.0091

LANDFALL ERRORS IN HURRICANE FORECASTS  
...8.0094

ANALYTICAL PHYSICAL MODEL ...8.0126  
 STORM-SURGE FORECASTING ...8.0136  
 TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH ...9.0055  
 COMPUTER SIMULATION OF SEVERE STORM OBSERVATIONS WITH DOPPLER RADARS ...12.0041  
 LONG-PERIOD WAVES AND SURGES ...13.0019  
 ASSESSMENT OF RESEARCH ON NATURAL HAZARDS ...16.0028

### *Mathematical Models*

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011  
 JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT ...2.0005  
 HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007  
 DROUGHT AND WET SPELLS IN NORTH DAKOTA ...2.0020  
 STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES ...3.0028  
 CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA ...3.0070  
 THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS ...3.0087  
 EARTHQUAKE MODELING ...3.0114  
 EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA ...3.0115  
 EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS ...3.0231  
 PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST ...5.0002  
 FIRE MANAGEMENT SYSTEMS ...5.0007  
 METHODS FOR THE PREVENTION AND CONTROL OF LIGHTNING FIRES ...5.0019  
 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040  
 FOREST FIRE STATISTICAL PROBLEMS ...5.0041  
 DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS ...5.0044  
 FLOOD INSURANCE STUDY ...6.0005  
 FLOOD INSURANCE STUDY ...6.0006  
 RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038  
 AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066  
 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082

FORECASTING RAINFALL AND FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113  
 FLOOD WAVES FROM A CONTROLLED BREACHED DAM ...6.0124  
 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134  
 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135  
 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149  
 OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150  
 RUNOFF SIMULATION ...6.0156  
 STOCHASTIC HYDROLOGY ...6.0167  
 PROCEDURES FOR ESTIMATING FLOOD FLOWS FROM SMALL RURAL WATERSHEDS ...6.0177  
 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALABAMA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234  
 RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259  
 EVALUATION OF FLOOD RISKS ...6.0264  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
 HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267  
 THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270  
 FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301  
 DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316  
 STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318  
 THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328  
 EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343  
 TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING ...6.0378  
 VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS ...6.0387  
 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392  
 NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396

NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN ...7.0018

GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0039

GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) ...8.0045

GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) ...8.0046

TROPICAL CYCLONE ENERGY TRANSFER ...8.0054

TROPICAL CYCLONES ...8.0055

HURRICANE MODIFICATION ...8.0057

A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS ...8.0059

STORM SURGE RESEARCH ...8.0060

HURRICANE RESEARCH MODELING ...8.0061

HURRICANE MODELING ...8.0062

SEA-AIR INTERACTION LABORATORY OPERATIONS ...8.0065

STATISTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (ABBREV) ...8.0070

STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION ...8.0072

PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL ...8.0089

STATISTICAL DYNAMICAL PREDICTION OF HURRICANE TRACKS ...8.0091

ERROR ANALYSIS OF HURRICANE FORECASTS ...8.0092

LANDFALL ERRORS IN HURRICANE FORECASTS ...8.0094

HURRICANE MODIFICATION BY CLOUD SEEDING ...8.0096

USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES ...8.0098

THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES ...8.0099

TROPICAL STORM SURGE FORECASTING ...8.0109

SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS ...8.0110

MARINE ENVIRONMENTAL PREDICTION ...8.0113

MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972 ...8.0115

FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES ...8.0116

NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH ...8.0117

NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES ...8.0125

ANALYTICAL PHYSICAL MODEL ...8.0126

A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES ...8.0130

THE DECISION PROCESS IN HURRICANE FORECASTING ...8.0131

NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO ...8.0138

DEVELOP METHODS FOR PREDICTING THE COMPONENTS OF GROUND MOVEMENT ABOVE MINE WORKINGS ...10.0005

THE MODIFICATION OF GREAT LAKES WINTER STORMS ...11.0003

PHYSICAL EVALUATION OF CLOUD SEEDING TECHNIQUES FOR MODIFYING OROGRAPHIC SNOWFALL - THE CASCADE PROJECT ...11.0007

NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS ...12.0019

STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA ...12.0034

PROBABILISTIC MODELING OF EXTREME LOADS ...12.0035

DUST DEVIL METEOROLOGY ...12.0036

TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS ...13.0015

LONG-PERIOD WAVES AND SURGES ...13.0019

NUMERICAL SIMULATION OF TSUNAMIS ...13.0020

RECENT TSUNAMI THEORY ...13.0023

TSUNAMI SHORELINE TRACT ...13.0024

THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL ...13.0026

SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN ...15.0024

MANAGEMENT OF INSURABLE RISK ...16.0021

FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1973 ...16.0069

METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER ...16.0105

#### *Physical Models*

STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (FS 047) ...3.0065

FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION ...5.0040

LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085

DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116

HYDRAULIC MODEL INVESTIGATION OF FLOOD CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS ...6.0120

MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY ...6.0312

GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION ...8.0040

WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION ...8.0041

WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION ...8.0042

DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION ...8.0043

JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK ...8.0119

ANALYTICAL PHYSICAL MODEL ...8.0126

THE MODIFICATION OF GREAT LAKES WINTER STORMS ...11.0003

TSUNAMI RESEARCH ...13.0004

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V ...13.0006

#### MONITORING

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN ...1.0004

ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION ...1.0005

EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES ...3.0037

MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104

A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES ...3.0202

ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS ...3.0220

SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 ...3.0245

SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION ...3.0275

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING ERTS DATA - ALASKA ...5.0013

MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY ...6.0030

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067

RESOURCE PLANNING ...6.0137

THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209

HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALABAMA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO ...6.0266

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA ...6.0321

THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

SEA-AIR INTERACTION LABORATORY OPERATIONS ...8.0065

GRAPHICAL DISPLAY OF HURRICANE FORECASTS ...8.0090

VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF THE GOES SATELLITE ...8.0108

OPERATION AGNES ...8.0135

LOCATION OF SLOPE FAILURE PLANES ...9.0009

WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL ...9.0013

LANDSLIDES - KENTUCKY ...9.0015

SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS ...9.0019

EVALUATION OF THE ION EXCHANGE LANDSLIDE CORRECTION TECHNIQUE ...9.0039

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY ...9.0050

COAL MINE DEFORMATION STUDIES, SOMERSET, COLORADO ...10.0004

ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY ...10.0007

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...10.0010

ESTABLISH TECHNIQUES FOR MONITORING SURFACE SUBSIDENCE OVER MINED AREAS ...10.0023

REMOTE SENSING, ALFAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

GEODIMETER STUDIES OF CASCADE VOLCANOES -  
WASHINGTON, OREGON AND CALIFORNIA ...14.0006

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

#### NUCLEAR MOISTURE METERS

EFFECT OF URBANIZATION ON FLOOD RUNOFF -  
WICHITA AREA ...6.0282

#### OBSERVATION WELLS

RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA ...6.0357

STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

LAND-SURFACE SUBSIDENCE, TEXAS CITY AND  
SEABROOK AREAS, TEXAS ...10.0012

CONTINUING QUANTITATIVE GROUND-WATER STU-  
DIES IN THE HOUSTON DISTRICT ...10.0013

CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF  
COAST AREA ...10.0032

#### OPTICAL INSTRUMENTATION

##### *Imaging*

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

##### *Photographic Instruments*

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

#### PESTICIDE APPLICATION

DEVELOPMENT OF NEW AND IMPROVED FIRE CON-  
TROL METHODS FOR SOUTHERN FORESTS ...5.0011

CONTROL AND USE OF FIRE PARTICULARLY IN WIL-  
DERNESS, PARK, AND OTHER RECREATIONAL AREAS  
...5.0020

EFFECT OF PRESCRIBED BURNING ON WATER YIELD  
AND QUALITY FROM BRUSH INFESTED LANDS -  
TEXAS ...5.0022

OSO CREEK TECHNICAL ASSISTANCE STUDY -  
PRELIMINARY STUDY ON THE PROBLEMS AND OR

#### PETROGRAPHY

HAWAIIAN VOLCANO OBSERVATORY ...14.0004

#### PIEZOMETRY

EARTH AND ROCKFILL DAM DESIGN PRACTICES  
...3.0171

#### PUMPING

NUTWOOD WATERSHED, ILLINOIS ...6.0199

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

CONTINUING QUANTITATIVE GROUND-WATER STU-  
DIES IN THE HOUSTON DISTRICT ...10.0013

STATEN ISLAND BEACH EROSION CONTROL AND HUR-  
RICANE PROTECTION PROJECT, STATEN ISLAND,  
NEW YORK ...15.0009

#### REMOTE SENSING

HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM  
SYSTEM ...6.0104

APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN  
ANALYSIS AND MANAGEMENT IN THE SUSQUEHAN-  
NA RIVER BASIN ...6.0337

REMOTE SENSING FOR RESOURCE MANAGEMENT AND  
FLOOD PLAIN DEFINITION ...6.0412

DEVELOPMENT OF CRITERIA FOR RECOGNIZING &  
IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED  
BY REMOTE SENSOR RETURNS - NORTH CAROLINA  
...9.0063

DETECTION OF SUBSURFACE OPENINGS - INDIANA,  
MISSOURI ...10.0009

EARLY DETECTION AND CORRECTION OF SINKHOLE  
PROBLEMS - ALABAMA ...10.0027

REMOTE SENSING, ALFAFIA AND PEACE RIVER  
BASINS, FLORIDA ...10.0029

EROSION AND DEPOSITION IN THE SOUNDS AND  
ESTUARIES OF THE NORTH CAROLINA COAST  
...15.0029

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

#### *Aircraft*

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
...1.0009

JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM  
FOR MITIGATION OF 1971 SOUTH FLORIDA  
DROUGHT ...2.0005

OKLAHOMA DROUGHT RELIEF OPERATIONAL PRO-  
GRAM (ODROP) ...2.0006

FIRE MANAGEMENT SYSTEMS ...5.0007

EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SER-  
VICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT  
ARGONNE NATIONAL LABORATORY (ABBREV)  
...5.0009

RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394

SEA-AIR INTERACTION LABORATORY OPERATIONS  
8.0065

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
GRAM - WASHINGTON, OREGON AND CALIFORNIA  
...14.0008

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

#### *Automatic Stations*

AUTOMATIC MICROEARTHQUAKE PROCESSING -  
CALIFORNIA ...3.0129

MONITORING FLOOD DAMAGE WITH SATELLITE  
IMAGERY ...6.0030

FLOODWAY EVALUATIONS BEFORE & AFTER CHAN-  
NEL MODIFICATIONS ASSUMING TOTAL  
METROPOLITAN DEVELOPMENT IN DRAINAGE  
BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

PERRIS VALLEY URBAN HYDROLOGY STUDY,  
CALIFORNIA ...6.0168

DEVELOPMENT OF WATER RESOURCE MANAGEMENT  
METHODS - TENNESSEE ...6.0367

MARINE ENVIRONMENTAL PREDICTION ...8.0113

MARINE CONDITIONS AND AUTOMATED FORECASTS  
FOR THE ATLANTIC COASTAL STORM OF FEBRUARY  
18-20, 1972 ...8.0115

FORECASTING EXTRATROPICAL STORM SURGES FOR  
THE NORTHEAST COAST OF THE UNITED STATES  
...8.0116

#### *Electromagnetic Radiation*

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

EM RADIATION-TORNADOES ...12.0027

#### *Infrared Radiation*

A MODEL OF THE FORESTS OF GLACIER NATIONAL  
PARK, MONTANA ...5.0021

AIRBORNE INFRARED FOREST FIRE DETECTION  
SYSTEM ...5.0028

TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

FLOOD PROFILES OF IOWA STREAMS ...6.0274

VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF  
THE GOES SATELLITE ...8.0108

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

DEFORMATION CHARACTERISTICS OF HILL SLOPES &  
CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS  
DEPICTED BY REMOTE SENSOR RETURNS - CALIFOR-  
NIA ...9.0036

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

DEVELOPING REMOTE SENSING TECHNIQUES FOR AID-  
ING PREDICTION OF LANDSLIDES ...9.0058

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
GRAM - WASHINGTON, OREGON AND CALIFORNIA  
...14.0008

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
...14.0009

#### *Lasers - Masers*

MEASUREMENT OF DYNAMIC CHARACTERISTICS OF  
SWITCHYARD EQUIPMENT ...3.0046

STRAINS AND TILTS ASSOCIATED WITH THE SAN FER-  
NANDO EARTHQUAKE ...3.0145

EARTH STRUCTURE AND FAULT TECTONICS AS RE-  
LATED TO EARTHQUAKE PREDICTION - CALIFORNIA  
...3.0153

#### *Microwave Radiation*

MICROWAVE METEOROLOGY ...8.0104

#### *Radar*

JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM  
FOR MITIGATION OF 1971 SOUTH FLORIDA  
DROUGHT ...2.0005

PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD  
SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED  
BY ATMOSPHERICS INCORPORATED (ABBREV)  
...2.0008

RADAR METEOROLOGY AS A MODERN TOOL FOR  
FOREST FIRE PROTECTION ...5.0029

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK  
ON TEN TASKS ...6.0298

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA ...5.0013

CORRELATION OF SATELLITE AND GROUND DATA IN  
AIR POLLUTION STUDIES (ABBREV) ...5.0032

MONITORING FLOOD DAMAGE WITH SATELLITE  
IMAGERY ...6.0030

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMEN-  
TAL RESEARCH PROGRAM - ILLINOIS ...6.0086

HYDROLOGIC DATA COLLECTION VIA GEOSTATIONA-  
RY SATELLITE ...6.0103

TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE  
SUSQUEHANNA RIVER BASIN ...6.0143

INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION  
TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK  
ON TEN TASKS ...6.0298

SURVEY OF LAKE FLOODING FROM ERTS-1 - LAKE  
CHAMPLAIN ...6.0393

INVESTIGATION OF SATELLITE OBSERVED TYPHOON-  
HURRICANE CLOUD CLUSTERS AND FLOW FEAT-  
URES ...8.0066

BAROTROPIC PREDICTION OF HURRICANE TRACKS  
...8.0093

USE OF SATELLITE DATA IN STUDIES OF TROPICAL  
DISTURBANCES ...8.0098

VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF  
THE GOES SATELLITE ...8.0108

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND  
CALIFORNIA ...13.0011

SATELLITE VOLCANO SURVEILLANCE - ALASKA,  
HAWAII AND WASHINGTON ...14.0002

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
GRAM - WASHINGTON, OREGON AND CALIFORNIA  
...14.0008

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
SATELLITE ...16.0047

DISASTER WARNING SATELLITE STUDY ...16.0048

#### *Spectral Reflectance*

FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION  
AND MAPPING OF FIRES ...5.0046

#### *SAMPLING*

ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE  
FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME I ...6.0015

TEXAS - DALLAS, AUSTIN ...6.0373  
URBAN HYDROLOGY STUDY - HOUSTON, TEXAS  
...6.0386

URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS  
...6.0389

CONTINUING QUANTITATIVE GROUND-WATER STU-  
DIES IN THE HOUSTON DISTRICT ...10.0013

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

#### *SIMULATION*

FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN  
AND DEVELOPMENT ...5.0033

RUNOFF SIMULATION ...6.0156

#### *SURVEYING METHODS*

PRELIMINARY INVESTIGATION OF STRUCTURAL  
DAMAGE FROM POINT MUGU, CALIFORNIA  
EARTHQUAKE OF FEBRUARY 21, 1973 ...3.0007

RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUC-  
TURES TO THE SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 ...3.0014

ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO  
EARTHQUAKE ...3.0055

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

SURVEY OF GULF COAST STRUCTURAL DAMAGE  
RESULTING FROM HURRICANE CAMILLE, AUGUST  
1969 ...8.0014

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

DEVELOPMENT OF CRITERIA FOR RECOGNIZING &  
IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED  
BY REMOTE SENSOR RETURNS - NORTH CAROLINA  
...9.0063

EARLY DETECTION AND CORRECTION OF SINKHOLE  
PROBLEMS - ALABAMA ...10.0027

THE OCHELTREE TORNADO - A CASE STUDY - MISSOU-  
RI ...12.0003

LUBBOCK TORNADO - A SURVEY OF BUILDING  
DAMAGE IN AN URBAN AREA - TEXAS ...12.0004

CONCRETE BLOCK REVETMENT NEAR BENEDICT,  
MARYLAND ...15.0004

ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TOR-  
NADOES AND HURRICANES ...16.0057

#### *Aerial Photography*

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA ...5.0013

FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA -  
VOLUME II, APPENDICES ...6.0040

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS ...6.0145

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

PERRIS VALLEY URBAN HYDROLOGY STUDY,  
CALIFORNIA ...6.0168

FLOOD PROFILES OF IOWA STREAMS ...6.0274

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MIS-  
SOURI ...6.0319

FLOODPLAIN MAPPING AND PLANNING FOR THE 50  
AND 100 YEAR INTERVAL FLOOD ZONES OF THE  
BITTERROOT VALLEY, MONTANA ...6.0321

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY  
...6.0323

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-  
USE MANAGEMENT OF FLOOD PLAINS ...6.0394

NEW TECHNIQUES FOR DELINEATION OF FLOOD  
PLAIN HAZARD ZONES - SOIL SURVEYS ...6.0411

COASTAL STORM DAMAGE WITH SPECIAL REFERENCE  
TO THE DELMARVA REGION OF DELAWARE, MARY-  
LAND, VIRGINIA ...8.0002

REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA  
AND PENNSYLVANIA ...9.0002

DEFORMATION CHARACTERISTICS OF HILL SLOPES &  
CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS  
DEPICTED BY REMOTE SENSOR RETURNS - CALIFOR-  
NIA ...9.0036

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

TREE-RING DATING & SPATIAL ANALYSIS OF LONG-  
TERM SLOPE MOVEMENTS - UTAH ...9.0055

LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

DEVELOPING REMOTE SENSING TECHNIQUES FOR AID-  
ING PREDICTION OF LANDSLIDES ...9.0058

ARIZONA EARTH FISSURE INVESTIGATION ...10.0014

STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC  
COASTAL PLAIN PROVINCE, NORTHERN ALASKA  
VOLUME I ...10.0025

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-  
MODELS - OHIO ...10.0031

SHORT-TERM CLIMATE CHANGES AND COASTAL ERO-  
SION, BARROW, ALASKA ...15.0014

A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST  
FLORIDA ...15.0017

GROIN STUDY ON THE NORTH SHORE OF SUFFOLK  
COUNTY, LONG ISLAND, NEW YORK, BETWEEN

...15.0030

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF  
LAKE ERIE ...15.0032

EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC  
FACTORS INFLUENCING EROSION OF THE OREGON  
COAST ...15.0033

#### *Construction Surveying*

EARTHQUAKES AND ACTIVE FAULTS ...3.0173

#### *Leveling*

FLOOD PROFILES OF IOWA STREAMS ...6.0274

#### *Plane Table Surveying*

SEA-CLIFF EROSION STUDIES, MASSACHUSETTS  
...15.0023

#### *Reconnaissance Surveying*

RECONNAISSANCE ENGINEERING GEOLOGY OF THE  
SITKA AREA, ALASKA ...13.0018

#### *Trilateration*

STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA  
...3.0126

#### *SYNTHETIC HYDROLOGY*

STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090

APPLICATION OF HYDROLOGIC AND HYDRAULIC  
RESEARCH TO CULVERT SELECTION IN MONTANA -  
VOLUME I - REPORT ...6.0125

STOCHASTIC HYDROLOGY ...6.0167

#### *Design Flow*

EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL  
DAMS ...3.0066

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS  
- ALABAMA ...6.0034

DRAINAGE AND FLOOD CONTROL BACKGROUND AND  
POLICY STUDY - SAN DIEGO ...6.0046

PEAK DISCHARGE AND FREQUENCY FOR SMALL  
WATERSHEDS IN COLORADO ...6.0049

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER  
MANAGEMENT ...6.0072

FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN  
GEORGIA ...6.0075

FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN IL-  
LINOIS ...6.0082

INITIAL RESULTS FROM THE UPPER WABASH SIMULA-  
TION MODEL ...6.0088



DESIGN OF OPTIMAL PRECIPITATION NETWORKS ...6.0107

RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112

DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116

ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION ...6.0118

FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS ...6.0120

SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122

INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136

STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA ...6.0139

FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS ...6.0145

COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS ...6.0148

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154

RUNOFF SIMULATION ...6.0156

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172

FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176

PROCEDURES FOR ESTIMATING FLOOD FLOWS FROM SMALL RURAL WATERSHEDS ...6.0177

GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179

FLOOD HYDROLOGY INVESTIGATIONS ...6.0183

FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326

FLOOD INVESTIGATIONS - NEW YORK ...6.0331

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344

APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN ...6.0346

FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383

URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384

URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389

MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH ...6.0392

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407

#### *Flow Routing*

PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061

FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA ...6.0062

OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150

RUNOFF SIMULATION ...6.0156

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALABAMA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234

FOR NEW YORK STATE - VOLUME I ...6.0328  
 THE EFFECT OF GROUND-WATER CONDITIONS ON  
 LOCAL FLOODING IN THE KINGSTON AREA,  
 PENNSYLVANIA ...6.0357  
 RELATION OF CLIMATIC AND WATERSHED CHARAC-  
 TERISTICS TO STORM RUNOFF IN THE EDWARDS  
 PLATEAU - TEXAS ...6.0388  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414

### *Hydrographs*

THE GENERATION OF FLOOD DAMAGE TIME  
 SEQUENCES ...6.0019  
 FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023  
 FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS  
 - ALABAMA ...6.0034  
 EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
 ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039  
 FLOODS FROM SMALL DRAINAGE AREAS IN CALIFOR-  
 NIA ...6.0043  
 INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060  
 PROGRAM FOR HYDROLOGIC INVESTIGATION OF  
 SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
 FLOOD HYDROLOGY AND URBAN WATER RESOURCES  
 OF THE ISLAND OF OAHU, HAWAII ...6.0077  
 INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF  
 HAWAIIAN SMALL WATERSHEDS ...6.0078  
 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN IL-  
 LINOIS ...6.0082  
 FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND  
 ...6.0102  
 SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN  
 RURAL MISSOURI ...6.0122  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR  
 SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM  
 SMALL WATERSHEDS IN OKLAHOMA ...6.0140  
 OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR  
 SMALL EASTERN WATERSHEDS ...6.0144  
 FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
 HIGHWAY CROSSINGS ...6.0145  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE  
 AREAS IN TEXAS ...6.0149  
 FLOODS FROM SMALL DRAINAGE AREAS - CALIFOR-  
 NIA ...6.0176  
 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL  
 DRAINAGE AREAS - VIRGINIA ...6.0180  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
 GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
 DAKOTA ...6.0219  
 HYDROGRAPH MODEL STUDIES OF THE HILL-  
 SBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS,  
 FLORIDA ...6.0234  
 TRAVEL TIME OF GEORGIA STREAMS ...6.0241  
 HYDROLOGIC RELATIONS IN HAWAII ...6.0247

OF WATERSHED PARAMETER ESTIMATION FOR THE  
 STANFORD WATERSHED MODEL ...6.0285  
 PREDICTION OF THE MAGNITUDES AND FREQUENCIES  
 OF FLOODS IN MICHIGAN ...6.0299  
 HYDROLOGY OF STREAMS IN ST. LOUIS  
 METROPOLITAN AREA ...6.0317  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
 GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
 DAKOTA ...6.0366  
 INVESTIGATION OF THE MAGNITUDE AND FREQUEN-  
 CY OF FLOODS ON SMALL STREAMS IN TENNESSEE  
 ...6.0371  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS  
 ...6.0386  
 VARIATION OF URBAN RUNOFF WITH DURATION AND  
 INTENSITY OF STORMS - TEXAS ...6.0387  
 STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
 DRAINAGE BASINS IN WYOMING ...6.0415  
 STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC  
 COASTAL PLAIN PROVINCE, NORTHERN ALASKA  
 VOLUME I ...10.0025  
 SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
 ...15.0030

### SYSTEMS ANALYSIS

OPTIMIZATION OF WATER RESOURCE SYSTEMS IN-  
 CORPORATING EARTHQUAKE RISK ...3.0102  
 RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL  
 ...6.0038  
 FLOOD HYDROLOGY AND URBAN WATER RESOURCES  
 OF THE ISLAND OF OAHU, HAWAII ...6.0077

### TECHNIQUE DEVELOPMENT

DEVELOPMENT OF METHODOLOGY FOR EVALUATION  
 AND PREDICTION OF AVALANCHE HAZARD IN THE  
 SAN JUAN MOUNTAINS OF COLORADO ...1.0008  
 WATER YIELD IMPROVEMENT AND AVALANCHE  
 HAZARD PREDICTION IN ALPINE AREAS OF THE  
 ROCKY MOUNTAINS ...1.0011  
 SNOW PACK STABILITY INDICES RELATIVE TO THE  
 CLIMAX AVALANCHE ...1.0013  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL  
 WATERSHEDS IN COLORADO ...6.0049  
 MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC  
 FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153  
 DEVELOPMENT OF AERIAL MEASUREMENT  
 TECHNIQUES ...6.0165  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL  
 WATERSHEDS IN COLORADO ...6.0186  
 DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN  
 URBAN AREAS ...6.0220

AL METEOROLOGIC PROBLEMS ...8.0058  
 INTERACTION LABORATORY OPERATIONS  
 55  
 NIQUE FOR THE ANALYSIS AND FORECASTING  
 OPICAL CYCLONE INTENSITIES FROM SATEL-  
 PICTURES ...8.0075  
 IBLE ROCK NOISE (SARN) AS A MEASURE OF  
 STABILITY, CALIFORNIA ...9.0006  
 ION OF THE ION EXCHANGE LANDSLIDE  
 ECTION TECHNIQUE ...9.0039  
 MPING REMOTE SENSING TECHNIQUES FOR AID-  
 EDICTION OF LANDSLIDES ...9.0058  
 MP METHODS FOR PREDICTING THE COM-  
 NTS OF GROUND MOVEMENT ABOVE MINE  
 INGS ...10.0005  
 ION OF SUBSURFACE OPENINGS - INDIANA,  
 URI ...10.0009  
 RE AND DEPICT TROUBLE AREAS IN STEREO-  
 LS - OHIO ...10.0031  
 I SYSTEMS ENGINEERING - NEW MEXICO AND  
 ORNIA ...13.0011  
 I RESEARCH AND ENGINEERING APPLICA-  
 ...13.0015  
 TER CONTAMINATION BY VOLCANIC  
 ILES FROM KILAUEA VOLCANO, HAWAII  
 E I) ...14.0015  
 L ZONE AND SHORELANDS MANAGEMENT -  
 T LAKES ...15.0026  
 ER AND CLIMATE MODIFICATION - PROBLEMS  
 ROGRESS ...16.0063  
 O IMPROVE LOCAL WEATHER FORECASTS  
 72

#### TELEMETRY

AL FIRE DANGER RATING ...5.0027

#### TRACER METHODS

ICAL PHYSICAL MODEL ...8.0126

### Technological Development

omics

### Tectogenesis

atural Geology  
 onics

### Tectonic History

*See Stratigraphy*  
*Geologic History*

### Tectonics

*See Structural Geology*

### Telecommunication Networks

*See Electronic Systems*  
*Communication Systems*

### Telemetry

*See Electronic Systems*  
*Communication Systems*  
*See Techniques and Instrumentation*

### Telesismology

*See Geophysics*  
*Seismology*

### Telluric Currents

*See Geophysics*  
*Electrical Properties*

### Temperate

*See Climates*

### Temperature

*See Soil Science and Mechanics*  
*Physical Properties*  
*See Water Quality*  
*Water Properties*

### Temperature Instruments

*See Meteorology*  
*Techniques and Instrumentation*

*See Geophysics*  
*Geothermal Properties*

## **Tensile**

*See Engineering Mechanics*  
*Stresses*

## **Terminals**

*See Transportation Engineering*

## **Terraces - Benches**

*See Geomorphology*  
*Streams*

## **Terrain Influences**

*See Air Pollution*  
*Meteorological Aspects*

## **Testing**

*See Buildings & Land Development*

## **Testing Facilities**

*See Electronic Systems*

## **Testing of Models**

*See Information Systems Research*  
*Mathematical Models*

## **Thermal**

*See Engineering Mechanics*  
*Stresses*

## **Thermal Features**

*See Geomorphology*  
*Groundwater Features*

## **Thermal Pollution**

*See Water Quality*  
*Pollution Sources*

*See Oceanography*  
*Sea Water Properties*

## **Thermal Waters**

*See Economic Geology*  
*Non-metallic Deposits*

## **Thermodynamic Relations**

*See Heat and Thermodynamics*

## **Thermodynamics**

*See Meteorology*

## **Thrust Faults**

*See Structural Geology*  
*Faults*

## **Thunderstorms**

*See Meteorology*  
*Atmosphere Disturbance*

## **Tidal Action**

*See Hydraulics*

## **Tides**

*See Also Oceanography*  
*Sea Water Motion*

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119

FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP AND TILLAMOOK COUNTIES, OREGON - 1972-1973 ...6.0352

COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA ...8.0002

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL ...8.0048

PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 ...8.0123

ANALYTICAL PHYSICAL MODEL ...8.0126

GEOSCIENCE  
NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
RELATIONSHIPS TO PLANNING, LOCATION AND  
DESIGN OF TRANSPORTATION FACILITIES ...16.0035

## Topographic Maps

*See Techniques and Instrumentation  
Maps and Surveys*

## Topography

*See Geomorphology  
Physlography*

## Tornadoes - Waterspouts

*See Meteorology  
Atmosphere Disturbance*

## Touring

*See Recreation  
Recreation Activities*

## Towers

*See Meteorology  
Techniques and Instrumentation*

## Trace Element Analysis

*See Geochemistry*

## Tracer Methods

*See Meteorology  
Techniques and Instrumentation  
See Techniques and Instrumentation*

## Tracers

*See Oceanography  
Oceanographic Techniques*

## Traffic Control

*See Transportation Engineering*

*See Transportation Engineering*

## Transform Faults

*See Structural Geology  
Faults*

## Transport Agents

*See Sedimentology  
Sediment Transport*

## Transport Effects

*See Sedimentology  
Sediment Transport*

## Transport Methods

*See Sedimentology  
Sediment Transport*

## Transportation Engineering

DYNAMIC STABILITY OF EARTH STRUCTURES ...3.0279  
FLOODS FROM SMALL DRAINAGE AREAS IN CALIFOR-  
NIA ...6.0043  
FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN  
GEORGIA ...6.0075  
HAWAII ENVIRONMENTAL SIMULATION MODEL  
...6.0252  
SLOPE STABILITY OF CUTS IN ONTONAGON CLAY  
...9.0016  
SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL  
SOILS ...9.0019  
COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE  
PROTECTION FOR EARTH EMBANKMENTS ...9.0025  
LIME SOIL STABILIZATION STUDY ...9.0037  
GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
...9.0041  
DENVER METROPOLITAN AREA, COLORADO ...9.0042  
SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...9.0043  
STABILIZATION OF STEEP LAND SLOPES - OHIO  
...9.0059

FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 ...5.0034  
EMERGENCY EQUIPMENT STANDARDS ...16.0042

# Basic Studies

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION ...6.0330  
XENIA REBUILDS ...12.0006

# Environment

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS ...6.0086  
NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES ...16.0035

# Geology & Rock Mechanics

PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
ENGINEERING GEOLOGY - ILLINOIS ...9.0011  
WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL ...9.0013  
LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE ...9.0022  
ROCK STRENGTH FROM FAILURE CASES ...9.0054

# Hydrology and Hydraulics

INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO ...6.0059  
INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060  
PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO ...6.0063  
FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI ...6.0065  
FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0077  
HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA ...6.0208  
HYDROLOGY OF OUTSTANDING FLOODS ...6.0211  
INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0219  
INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222  
FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327

# Soils

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS ...3.0010  
EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA ...3.0094  
INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV) ...4.0002  
MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO ...10.0031

# Structures

PROTECTION OF TRANSPORTATION FACILITIES AGAINST EARTHQUAKES ...3.0199  
INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

# Surveying

MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO ...10.0031

# Weather

DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023

# BRIDGES AND CULVERTS

LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES ...3.0003  
INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES ...3.0086  
A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL ...3.0097  
ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES ...3.0098  
ELASTOMERIC ENERGY ABSORBER ...3.0152  
TECHNIQUES FOR RETROFITTING EXISTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE ...3.0204  
PROBABILISTIC METHODS IN CIVIL ENGINEERING ...3.0208  
A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES ...6.0016  
FLOOD PROTECTION AT CULVERT OUTLETS ...6.0050  
COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064  
FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079

ADAMS MASSACHUSETTS ...6.0120  
 SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN  
 RURAL MISSOURI ...6.0122  
 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
 SALEM, NORTH CAROLINA ...6.0134  
 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
 NORTH CAROLINA ...6.0135  
 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
 NORTH CAROLINA ...6.0136  
 STATEWIDE FLOOD-FREQUENCY REPORT  
 OKLAHOMA ...6.0139  
 FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
 HIGHWAY CROSSINGS ...6.0145  
 FLOOD INVESTIGATIONS - TENNESSEE ...6.0147  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE  
 AREAS IN TEXAS ...6.0149  
 REVIEW EMERGENCY RELIEF FILES AND SURVEY THE  
 TREND OF BRIDGE LOSSES DURING STORM CONDI-  
 TIONS ...6.0155  
 FLOODWAY EVALUATIONS BEFORE & AFTER CHAN-  
 NEL MODIFICATIONS ASSUMING TOTAL  
 METROPOLITAN DEVELOPMENT IN DRAINAGE  
 BASINS JEFFERSON COUNTY, ALABAMA ...6.0161  
 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL  
 DRAINAGE AREAS - VIRGINIA ...6.0180  
 PEAK DISCHARGE AND FREQUENCY FOR SMALL  
 WATERSHEDS IN COLORADO ...6.0186  
 INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES  
 ...6.0189  
 INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA  
 ...6.0212  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM  
 SMALL DRAINAGE AREAS IN SOUTH CAROLINA  
 ...6.0222  
 FLOOD PROFILES OF IOWA STREAMS ...6.0274  
 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN  
 COUNTY, IOWA ...6.0275  
 CITY OF JACKSON WATER RESOURCES STUDY ...6.0311  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
 & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 EFFECTS OF URBANIZATION ON FLOODS IN CHAR-  
 LOTTE, NORTH CAROLINA ...6.0342  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGAN-  
 TON, NORTH CAROLINA ...6.0343  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
 STREAMS - NORTH DAKOTA ...6.0344  
 AN EVALUATION OF HURRICANE AGNES FLOODS IN  
 COMPARISON TO BRIDGE DESIGN INFORMATION  
 AVAILABLE FOR PENNSYLVANIA CONTEMPORANE-  
 OUSLY ...6.0355  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
 GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
 DAKOTA ...6.0366

EFFECTS ON STRUCTURE DESIGN AND PER-  
 FORMANCE ...9.0018  
 SNOW AND ICE DETECTION AND WARNING SYSTEMS  
 ...11.0002

## CONSTRUCTION

EARTHQUAKE - INDUCED EMBANKMENT DISTRESS  
 ...3.0010  
 ENGINEERING GEOLOGY - ILLINOIS ...9.0011  
 INVESTIGATION OF LANDSLIDES ON HIGHWAYS  
 ...9.0014  
 TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS  
 AND TESTIMONY - VOLUME V ...13.0006

## DESIGN

INVESTIGATION OF HIGHWAY BRIDGE DESIGN  
 METHODOLOGY FOR PROVIDING STRUCTURAL RE-  
 SISTANCE TO EARTHQUAKES ...3.0086  
 FLOOD INVESTIGATIONS - HIGHWAY COMMISSION -  
 KANSAS ...6.0091  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR  
 SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE  
 AREAS IN TEXAS ...6.0149  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
 GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
 DAKOTA ...6.0219  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM  
 SMALL DRAINAGE AREAS IN SOUTH CAROLINA  
 ...6.0222  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
 DRAINAGE AREAS IN FLORIDA ...6.0233  
 FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327  
 FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 INVESTIGATION AND ANALYSIS OF FLOOD HYDRO-  
 GRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH  
 DAKOTA ...6.0366  
 FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
 INVESTIGATION OF LANDSLIDES ON HIGHWAYS  
 ...9.0014  
 DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOL-  
 LOWING A NATURAL DISASTER ...16.0034

## Location

NATURAL ENVIRONMENTAL HAZARDS AND THEIR  
 RELATIONSHIPS TO PLANNING, LOCATION AND  
 DESIGN OF TRANSPORTATION FACILITIES ...16.0035

## Standards & Criteria

PROTECTION OF TRANSPORTATION FACILITIES  
 AGAINST EARTHQUAKES ...3.0199

1977 AND PUBLIC POLICY ...3.0199  
PROTECTION OF TRANSPORTATION FACILITIES  
AGAINST EARTHQUAKES ...3.0199

#### DRAINAGE

FLOOD FLOWS FROM SMALL DRAINAGE AREAS  
...6.0058  
INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL DRAINAGE AREAS IN OHIO ...6.0059  
INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060  
PROGRAM FOR HYDROLOGIC INVESTIGATION OF  
SMALL DRAINAGE AREAS IN TEXAS ...6.0061  
FLOOD CHARACTERISTICS OF SMALL DRAINAGE  
AREAS, IDAHO ...6.0063  
COLLECTION AND ANALYSIS OF STREAM FLOW AND  
RELATED HYDRAULIC DATA FOR DESIGN OF  
HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064  
FLOOD FREQUENCY IN SMALL DRAINAGE AREAS -  
MISSISSIPPI ...6.0065  
FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN IL-  
LINOIS ...6.0082  
LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085  
INVESTIGATION AND ANALYSIS OF FLOODS FOR  
SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
HYDROLOGY OF OUTSTANDING FLOODS ...6.0211  
INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA  
...6.0212  
INVESTIGATION AND ANALYSIS OF FLOODS FROM  
SMALL DRAINAGE AREAS IN SOUTH CAROLINA  
...6.0222  
MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
DRAINAGE AREAS IN FLORIDA ...6.0233  
FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327  
URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS  
...6.0377  
FLOOD INVESTIGATIONS IN WYOMING ...6.0414  
STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415  
WATER DRAINAGE FROM IN-PLACE FILLS TO  
PREVENT OR HALT FILL ...9.0013  
DEVELOPING REMOTE SENSING TECHNIQUES FOR AID-  
ING PREDICTION OF LANDSLIDES ...9.0058

#### ECONOMICS

TECHNIQUES FOR RETROFITTING EXISTING BRIDGE  
STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO  
EARTHQUAKE DAMAGE ...3.0204

EARTHQUAKE COMMISSION ...3.0004  
DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 ...3.0017  
SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN  
TECHNICAL REPORT ...6.0042  
FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS ...6.0145  
A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
ILLINOIS ...6.0260  
MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOP-  
MENT PLAN ...6.0363  
LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT  
NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE  
POTENTIAL IN THE PIERRE SHALE ...9.0022  
MEASURE AND DEPICT TROUBLE AREAS IN STEREO  
MODELS - OHIO ...10.0031  
CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES -  
NEBRASKA (PROJECT 20/20) ...16.0014  
DEBRIS CLEARING TIMES AFFECTING CRITICAL SUR-  
VIVAL ACTIONS ...16.0026

#### County

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR  
REVISION AND EXPANSION ...6.0330

#### Freeways

THE SAN FERNANDO EARTHQUAKE SOILS AND  
GEOLOGIC INVESTIGATIONS IN RELATION TO  
HIGHWAY DAMAGE ...3.0012

#### Interstate

CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GOR-  
MAN, CALIFORNIA ...9.0017

#### State

AVALANCHES ON THE NORTH CASCADES HIGHWAY  
(SR-20) - SUMMARY REPORT ...1.0006

#### Urban

LARGE SCALE INTEGRATION IN URBAN PLANNING  
WITH APPLICATIONS TO TALL BUILDING PLANNING  
IN REGIONS SUBJECTED TO NATURAL HAZARDS  
...3.0257  
COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
...6.0148

#### INTERSECTIONS

DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF  
FEBRUARY 9, 1971 ...3.0017  
FLOOD PREDICTION METHODS FOR PENNSYLVANIA  
HIGHWAY CROSSINGS ...6.0145



AVALANCHE CONTROL IMPLEMENTATION STUDY ...1.0014  
 A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023  
 SNOW AND ICE DETECTION AND WARNING SYSTEMS ...11.0002  
 DETERMINATION OF SNOW FENCE DESIGN CRITERIA, AND DEVELOPMENT OF A HANDBOOK FOR SNOW CONTROL ...11.0008  
 DEBRIS CLEARING TIMES AFFECTING CRITICAL SURVIVAL ACTIONS ...16.0026

#### QUALITY CONTROL

EMERGENCY EQUIPMENT STANDARDS ...16.0042

#### ROADWAY

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV) ...8.0011  
 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV) ...8.0012

#### SERVICES

##### *Freight*

GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV) ...8.0012

##### *Passenger*

DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER ...16.0034

#### TERMINALS

##### *Parking*

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS ...4.0008

##### *Ports & Harbors*

GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V ...13.0006  
 ...8.0012

#### *Warehouses*

GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV) ...8.0012

#### TRAFFIC ENGINEERING

DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA ...6.0028

#### *Accidents*

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) ...16.0014

#### *Congestion*

DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER ...16.0034

#### *Highway Emergency*

AVALANCHE CONTROL IMPLEMENTATION STUDY ...1.0014  
 CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) ...16.0014  
 DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023  
 EVALUATION OF EMERGENCY CALL SYSTEMS ...16.0031  
 DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER ...16.0034

#### *Road Obstacles*

AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT ...1.0006  
 DEBRIS CLEARING TIMES AFFECTING CRITICAL SURVIVAL ACTIONS ...16.0026

#### *Safety*

PROBABILISTIC METHODS IN CIVIL ENGINEERING ...3.0208

#### *Traffic Control*

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332  
 SNOW AND ICE DETECTION AND WARNING SYSTEMS ...11.0002  
 DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023

### *Emergency Vehicles*

HELICOPTER AMBULANCE SERVICE TO EMERGENCIES  
...16.0012

CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES -  
NEBRASKA (PROJECT 20/20) ...16.0014

DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMER-  
GENCY MEDICAL CARE, IN THE METROPOLITAN  
NASHVILLE-MIDDLE TENNESSEE REGION ...16.0023

THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL  
CARE SYSTEMS ...16.0024

DEBRIS CLEARING TIMES AFFECTING CRITICAL SUR-  
VIVAL ACTIONS ...16.0026

EMERGENCY EQUIPMENT STANDARDS ...16.0042

### *Helicopters*

HELICOPTER AMBULANCE SERVICE TO EMERGENCIES  
...16.0012

THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL  
CARE SYSTEMS ...16.0024

### *Pipelines*

UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND  
DAMAGE RELATED TO EXPANSIVE EARTH MATERI-  
ALS ...4.0008

MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN  
AND VICINITY AREA) ...6.0099

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS  
AND TESTIMONY - VOLUME V ...13.0006

### *Water Transportation*

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER  
RESOURCES PLANNING STUDIES IN NEW YORK  
...6.0130

MODEL STUDY OF CANNELTON LOCKS AND DAM,  
OHIO RIVER, INDIANA AND KENTUCKY ...6.0312

## **Transportation Systems**

*See Transportation Engineering*

## **Transverse**

*See Engineering Mechanics*  
*Forces and Loadings*

## **Trends and Cycles**

*See Economics*

*See Techniques and Instrumentation*  
*Surveying Methods*

## **Tropical**

*See Climates*

## **Trusses**

*See Mechanics of Structures*

## **Tsunamis**

*See Oceanography*  
*Sea Water Motion*

## **Tuff**

*See Igneous Rocks*

## **Tundra**

STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING  
ERTS DATA - ALASKA ...5.0013

## **Turbidity**

*See Water Quality*  
*Water Properties*

## **Turbidity Currents**

*See Oceanography*  
*Marine Geology*

## **Turbulence**

*See Oceanography*  
*Sea Water Motion*

## **Turbulent Flow**

*See Hydraulics*  
*Flow Types - Natural Water*

## **Unconsolidated Deposits**

*See Sedimentology  
Sedimentary Deposits*

## **Under-water**

*See Buildings & Land Development  
Construction*

## **Underground Waste Disposal**

*See Water Quality  
Pollution Sources*

## **Unsteady Flow**

*See Hydraulics  
Flow Types - Natural Water*

## **Uplift**

*See Soil Science and Mechanics  
Pressure*

## **Urban**

*See Transportation Engineering  
Highway Classification*

## **Urban Environments**

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

STUDIES OF URBAN EFFECTS ON RAINFALL AND  
SEVERE WEATHER ...2.0004

HYDROLOGIC SYSTEMS MODELING AND SIMULATION  
...2.0007

POTENTIAL OF PRECIPITATION MODIFICATION IN  
MODERATE TO SEVERE DROUGHTS ...2.0012

REGIONAL AND DETAILED GRAVITY STUDIES IN TEC-  
TONICALLY ACTIVE AREAS - CALIFORNIA ...3.0124

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND IN-  
COME DISTRIBUTION EFFECTS IN RALSTON CREEK  
WATERSHEDS ...6.0018

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK  
HAVEN, PENNSYLVANIA ...6.0024

MODEL CITIES ONE - URBAN RENEWAL PROJECT,  
READING, PENNSYLVANIA ...6.0025

KINGSTON DISASTER URBAN RENEWAL PROJECT,  
BOROUGH OF KINGSTON, LUZERNE COUNTY,  
PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

STUDIES IN CONNECTION WITH HYDROLOGIC AND RE-  
LATED PHYSICAL PROCESSES IN THE OLYMPUS  
COVE AREA OF SALT LAKE COUNTY ...6.0031

EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

DRAINAGE AND FLOOD CONTROL BACKGROUND AND  
POLICY STUDY - SAN DIEGO ...6.0046

FLOOD FREQUENCY IN URBAN AREAS, COLORADO  
...6.0048

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN  
AN URBAN AREA - PHASE III ...6.0073

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN  
FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
...6.0074

URBAN HYDROLOGY AND URBAN WATER RESOURCES  
OF THE ISLAND OF OAHU, HAWAII ...6.0076

FLOOD HYDROLOGY AND URBAN WATER RESOURCES  
OF THE ISLAND OF OAHU, HAWAII ...6.0077

DEVELOPMENT OF A FLOOD AND POLLUTION CON-  
TROL PLAN FOR THE CHICAGOLAND AREA - COM-  
PUTER SIMULATION PROGRAMS ...6.0083

STREAMFLOW PATTERNS WATERSHED CHARAC-  
TERISTICS THROUGH USE OF OPSET - A SELF  
CALIBRATING VERSION OF STANFORD WATERSHED  
MODEL (ABBREV) ...6.0092

RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS ...6.0112

PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...6.0119

FACTORS PERTINENT TO WATER QUALITY IN THE AL-  
BUQUERQUE METROPOLITAN AREA ...6.0128

AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
NORTH CAROLINA ...6.0135

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
NORTH CAROLINA ...6.0136

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC  
FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153

RUNOFF SIMULATION ...6.0156

FLOODWAY EVALUATIONS BEFORE & AFTER CHAN-  
NEL MODIFICATIONS ASSUMING TOTAL  
METROPOLITAN DEVELOPMENT IN DRAINAGE  
BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES ...6.0165

- URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169
- GLENDORA, CALIFORNIA, GENERAL PLAN 1990 ...6.0170
- DENVER METROPOLITAN AREA, COLORADO ...6.0184
- FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187
- HYDROLOGY OF SMALL WATERSHEDS ...6.0190
- SOCIALLY DEFINED ENVIRONMENTAL VALUES IN URBAN WATER RESOURCES PLANNING ...6.0191
- VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205
- DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220
- IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237
- SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238
- THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240
- THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242
- A PROGRAM FOR METROPOLITAN WATER MANAGEMENT ...6.0243
- ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244
- NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258
- FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS ...6.0261
- THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270
- FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0275
- FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0276
- FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0279
- EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281
- EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282
- FLOOD PLAIN STUDIES--MINNESOTA ...6.0304
- URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV) ...6.0308
- CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310
- HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317
- HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319
- STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335
- HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338
- URBAN RUNOFF ...6.0339
- EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343
- FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO ...6.0362
- FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370
- URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372
- URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373
- EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374
- EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA ...6.0376
- URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377
- WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379
- URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382
- URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383
- URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384
- PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT ...6.0385
- URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386
- URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389
- DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS OF URBAN AREAS ...6.0390
- URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400
- URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401
- SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040
- SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA ...9.0043
- MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...9.0045
- EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES ...16.0022

PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT ...16.0054

METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER ...16.0105

## Urban Government

*See Urban Research*

## Urban Industry

*See Urban Research*

## Urban Planning

*See Urban Research*

## Urban Renewal

*See Urban Research*

## Urban Research

STUDY OF SEAWATER DESALTING AS EMERGENCY WATER SUPPLY FOR NEW YORK CITY ...2.0001

STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER ...2.0004

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007

MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA ...3.0104

CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH ...5.0008

EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV) ...5.0009

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073

RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112

EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136

RUNOFF SIMULATION ...6.0156

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA ...6.0279

STUDY ...6.0310  
HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382

URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386

TEXAS COAST HURRICANE SURGE MODEL STUDIES ...8.0013

GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA ...9.0041

DENVER-FRONT RANGE URBAN CORRIDOR ...9.0044

DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS ...12.0017

STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS ...12.0032

IMPACT OF THE LUBBOCK STORM ON REGIONAL SYSTEMS - TEXAS ...12.0040

HELICOPTER AMBULANCE SERVICE TO EMERGENCIES ...16.0012

DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER ...16.0034

CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I ...16.0082

## Housing

SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042

DEBRIS CLEARING TIMES AFFECTING CRITICAL SURVIVAL ACTIONS ...16.0026

## Housing Demand

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...16.0081

## Housing Location

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239

## Housing Rehabilitation

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260

## LAND USE

- URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018
- PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168
- URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169
- GLENDORA, CALIFORNIA, GENERAL PLAN 1990 ...6.0170
- DENVER METROPOLITAN AREA, COLORADO ...6.0184
- HAMILTON 2 DEGREE ...6.0188
- IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237
- THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273
- EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281
- COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332
- URBAN RUNOFF ...6.0339
- GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032
- DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020
- URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV) ...16.0038
- PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...16.0075
- ### PUBLIC WORKS
- REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV) ...3.0022
- SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT ...6.0042
- HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067
- FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0077
- PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119
- PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV) ...6.0175

## A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260

### SOCIAL ENVIRONMENT

- THE UNPREDICTABLE DISASTER IN A METROPOLIS - PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971 ...3.0074
- DEBRIS CLEARING TIMES AFFECTING CRITICAL SURVIVAL ACTIONS ...16.0026
- ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES ...16.0100

### URBAN GOVERNMENT

- EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES ...16.0022
- PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW ...16.0050
- THE CHARLOTTE CONSORTIUM TASK 1 REPORT - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM ...16.0096
- THE WICHITA FALLS CONSORTIUM PHASE I REPORT - VOLUME III - ANALYSIS OF MUNICIPAL ACTIVITIES - SECTION IV - PUBLIC SAFETY SUBSYSTEM ...16.0103

### URBAN INDUSTRY

- A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260

### URBAN PLANNING

- MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA ...3.0120
- THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN ...3.0149
- SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS ...3.0229
- LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS ...3.0257
- MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA ...6.0025
- PENN-SUSQUEHANNA URBAN RENEWAL PROJECT, HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-634C ...6.0026
- DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA ...6.0028
- KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS  
...6.0148

NORTH RICHMOND - SAN PABLO BAY AREA STUDY -  
CALIFORNIA ...6.0178

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
AURORA, N.Y. ...6.0332

WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379

PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMA-  
RY REPORT ...6.0385

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

XENIA REBUILDS ...12.0006

PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM  
SERVING THE EMERGENCY SERVICE DEPARTMENTS  
OF THE CITY OF LOS ANGELES (ABBREV) ...16.0036

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...16.0038

PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION  
TASK COMPLETION REPORT ...16.0051

ENVIRONMENTAL PLANNING AND GEOLOGY -  
PROCEEDINGS OF THE SYMPOSIUM ON ENGINEER-  
ING GEOLOGY IN THE URBAN ENVIRONMENT  
...16.0054

EMERGENCY OPERATIONS CONTINGENCY PLANNING -  
NEW ORLEANS, LOUISIANA ...16.0059

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...16.0075

THE CHARLOTTE CONSORTIUM TASK 1 REPORT -  
VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES -  
PUBLIC SAFETY SUBSYSTEM ...16.0096

THE WICHITA FALLS CONSORTIUM PHASE I REPORT -  
VOLUME III - ANALYSIS OF MUNICIPAL ACTIVITIES -  
SECTION IV - PUBLIC SAFETY SUBSYSTEM ...16.0103

#### URBAN RENEWAL

LOCK HAVEN URBAN RENEWAL PROJECT, LOCK  
HAVEN, PENNSYLVANIA ...6.0024

MODEL CITIES ONE - URBAN RENEWAL PROJECT,  
READING, PENNSYLVANIA ...6.0025

PENN-SUSQUEHANNA URBAN RENEWAL PROJECT,  
HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-  
634C ...6.0026

MILTON SOUTH, MILTON NORTH AND TURBOT  
TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS,  
PENNSYLVANIA ...6.0027

DOWNTOWN URBAN RENEWAL PROJECT, WILKE-  
SBARRE, PENNSYLVANIA ...6.0028

KINGSTON DISASTER URBAN RENEWAL PROJECT,  
BOROUGH OF KINGSTON, LUZERNE COUNTY,  
PENNSYLVANIA, HUD PROJECT NO. R-615C ...6.0029

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
ILLINOIS ...6.0030

#### URBAN SERVICES

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, AND COSTS OF GEOLOGIC  
HAZARDS AND RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...3.0011

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
AURORA, N.Y. ...6.0332

PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM  
SERVING THE EMERGENCY SERVICE DEPARTMENTS  
OF THE CITY OF LOS ANGELES (ABBREV) ...16.0036

PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION  
TASK COMPLETION REPORT ...16.0051

THE POLICE DEPARTMENT IN NATURAL DISASTER  
OPERATIONS ...16.0097

ORGANIZATIONAL RESPONSES TO MAJOR COMMUNI-  
TY CRISES ...16.0100

#### URBAN TRANSPORTATION

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
AURORA, N.Y. ...6.0332

MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOP-  
MENT PLAN ...6.0363

#### URBANIZATION

STUDIES IN CONNECTION WITH HYDROLOGIC AND RE-  
LATED PHYSICAL PROCESSES IN THE OLYMPUS  
COVE AREA OF SALT LAKE COUNTY ...6.0031

EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

DRAINAGE AND FLOOD CONTROL BACKGROUND AND  
POLICY STUDY - SAN DIEGO ...6.0046

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
SALEM, NORTH CAROLINA ...6.0134

EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
NORTH CAROLINA ...6.0135

THE IMPACT OF URBANIZATION ON WATER YIELD,  
FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALI-  
TY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

PERRIS VALLEY URBAN HYDROLOGY STUDY,  
CALIFORNIA ...6.0168

URBAN HYDROLOGY OF POWAY VALLEY, CALIFOR-  
NIA ...6.0169

ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
NOFF CHARACTERISTICS - GEORGIA ...6.0244

SPECIAL FLOOD-DATA COLLECTION - HAWAII ...6.0251

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES,  
MACON COUNTY, ILLINOIS ...6.0258

THE EFFECT OF URBANIZATION ON HYDROLOGY OF  
WATERSHEDS - INDIANA ...6.0270

EFFECT OF URBANIZATION ON FLOOD RUNOFF -

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342  
 EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373  
 EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374  
 EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA ...6.0376  
 OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389  
 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400  
 DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020

### Urban Runoff

*See Water Runoff*

### Urban Services

*See Urban Research*

### Urban Transportation

*See Urban Research*

### Urbanization

*See Urban Research*

### User Surveys

*See Water Resources Management*

### Utilities

*See Buildings & Land Development  
 Building Classification*

### Control Devices

### Vane Test

*See Soil Science and Mechanics  
 Techniques and Instrumentation*

### Vibration

*See Techniques and Instrumentation  
 Measurements & Measuring*

### Void Ratio and Porosity

*See Soil Science and Mechanics  
 Physical Properties*

### Volcanic Eruptions

*See Volcanics*

### Volcanic Rocks

*See Igneous Rocks*

### Volcanic Stratigraphy

*See Stratigraphy*

### Volcanics

#### Pillow Lava

GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA ...9.0032

#### VOLCANIC ERUPTIONS

URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THE MITIGATION (ABBREV) ...3.0011

HAWAIIAN VOLCANO OBSERVATORY ...3.0057

SNAKE RIVER PLAIN, PART E - NORTH CENTRAL IDAHO ...3.0181



...14.0001

SEISMIC SURVEILLANCE OF AUGUSTINE REDOUBT  
AND SPURR VOLCANOES, COOK INLET, ALASKA  
...14.0005

VOLCANIC HAZARDS, ISLAND OF HAWAII ...14.0010

EASTERN SNAKE RIVER PLAIN REGION INVESTIGA-  
TIONS - IDAHO ...14.0011

URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NA-  
TURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV) ...16.0038

## **VOLCANOES**

SEISMICITY INVESTIGATIONS IN THE CASCADE MOUN-  
TAINS AND VICINITY, OREGON, 1 MAY 1969 - 30  
APRIL 1970 ...3.0266

SATELLITE VOLCANO SURVEILLANCE - ALASKA,  
HAWAII AND WASHINGTON ...14.0002

GEODIMETER STUDIES OF CASCADE VOLCANOES -  
WASHINGTON, OREGON AND CALIFORNIA ...14.0006

VOLCANIC HAZARDS IN THE CASCADE RANGE -  
CALIFORNIA AND WASHINGTON ...14.0007

THERMAL SURVEILLANCE OF VOLCANOES - REMOTE  
SENSING OF LONG VALLEY IN GEOTHERMAL PRO-  
GRAM - WASHINGTON, OREGON AND CALIFORNIA  
...14.0008

THERMAL SURVEILLANCE OF ACTIVE VOLCANOES  
...14.0009

REGIONAL VOLCANOLOGY - WESTERN UNITED  
STATES INCLUDING ALASKA AND HAWAII ...14.0014

RAINWATER CONTAMINATION BY VOLCANIC  
VOLATILES FROM KILAUEA VOLCANO, HAWAII  
(PHASE I) ...14.0015

SEISMIC ACTIVITY OF THE CASCADE VOLCANOES  
...14.0016

## **Volcanoes**

*See Geochemistry*  
*See Structural Geology*  
*Tectonic Features*  
*See Volcanics*

## **Vorticity**

*See Meteorology*

## **Walls**

*See Buildings & Land Development*  
*Components and Equipment*

## **Warning Systems**

*See Also Electronic Systems*

SEARCH AND RESCUE COMMUNICATION-GLOBAL  
RESCUE ALARM NET (GRAN) ...16.0010

IMPROVED OUTDOOR ALERTING AND WARNING  
...16.0039

A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR  
NATURAL DISASTER WARNING COMMUNICATIONS  
SATELLITE ...16.0047

DISASTER WARNING SATELLITE STUDY ...16.0048

THE WARNING SYSTEM IN DISASTER SITUATIONS - A  
SELECTIVE ANALYSIS ...16.0099

## **Washout - Scavenging**

*See Air Pollution*  
*Meteorological Aspects*

## **Waste Type**

*See Solid Waste Management*

## **Waste Water Treatment/Disposal**

### **DOMESTIC WASTES**

URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV) ...6.0308

### **INDUSTRIAL WASTES**

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

### **SEWAGE SYSTEM**

INITIAL WATER, SEWERAGE AND FLOOD ...6.0047

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
AURORA, N.Y. ...6.0332

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS  
...6.0377

### **Combined Sewers**

RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS ...6.0112

RURAL AREAS ...6.0312  
HYDROLOGY OF STREAMS IN ST. LOUIS  
METROPOLITAN AREA ...6.0317

#### *Regional Systems*

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND  
PUBLIC ACTION FOR LOCAL AND REGIONAL WATER  
CONSERVATION ...6.0051  
RECOMMENDED REGIONAL PLAN FOR SEWERAGE,  
WATER SUPPLY AND STORM DRAINAGE - CONNEC-  
TICUT ...6.0192  
URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV) ...6.0308

#### *Septic Tanks*

ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

#### *Sewage Treatment*

FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023  
A STUDY OF THE OPTIMAL MIX OF PRIVATE AND  
PUBLIC ACTION FOR LOCAL AND REGIONAL WATER  
CONSERVATION ...6.0051

#### *Storage and Retention*

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND  
PUBLIC ACTION FOR LOCAL AND REGIONAL WATER  
CONSERVATION ...6.0051

#### *Storm Sewers*

HYDROLOGIC SYSTEMS MODELING AND SIMULATION  
...2.0007  
RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS ...6.0112  
PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...6.0119  
EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-  
SALEM, NORTH CAROLINA ...6.0134  
EFFECTS OF URBANIZATION ON FLOODS AT DURHAM,  
NORTH CAROLINA ...6.0135  
EFFECTS OF URBANIZATION ON FLOODS AT LENOIR,  
NORTH CAROLINA ...6.0136  
FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
...6.0187  
RECOMMENDED REGIONAL PLAN FOR SEWERAGE,  
WATER SUPPLY AND STORM DRAINAGE - CONNEC-  
TICUT ...6.0192  
ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
NOFF CHARACTERISTICS - GEORGIA ...6.0244  
EFFECT OF URBANIZATION ON FLOOD RUNOFF -  
WICHITA AREA ...6.0282  
URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN  
MANAGEMENT, SANITARY SEWERAGE, SOLID  
WASTE MANAGEMENT (ABBREV) ...6.0307

LOTTE, NORTH CAROLINA ...6.0343  
EFFECTS OF URBANIZATION ON FLOODS AT MORGAN-  
TON, NORTH CAROLINA ...6.0343

#### *WASTE WATER DISPOSAL*

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034  
EASTERN SNAKE RIVER PLAIN REGION INVESTIGA-  
TIONS - IDAHO ...3.0179  
PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...16.0075

#### *WASTE WATER TREATMENT*

DETERMINATION OF DECISION MAKING PROCESSES IN  
WATER RESOURCE PLANNING AND DEVELOPMENT -  
THE CONNECTICUT RIVER BASIN ...6.0292  
URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV) ...6.0308

#### *Water Allocation*

*See Water Supply*

#### *Water Budget*

*See Water Supply*

#### *Water Circulation*

GENERAL PLAN REPORT, LAKE RED BLUFF AREA,  
CALIFORNIA, 1971 ...6.0179  
PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...6.0221  
TEXAS COAST HURRICANE SURGE MODEL STUDIES  
...8.0013  
MICRO AND MESOSCALE GEOPHYSICAL FLUID  
DYNAMICS ...8.0120  
SAN FRANCISCO BAY ...15.0013

#### *Water Content*

*See Soil Science and Mechanics*  
*Physical Properties*

## **Water Content Test**

*See Soil Science and Mechanics  
Techniques and Instrumentation*

## **Water Currents**

INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA  
...6.0212

PROTECTION OF NARRAGANSETT BAY FROM HUR-  
RICANE SURGES ...8.0047

ANALYTICAL PHYSICAL MODEL ...8.0126

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS  
AND TESTIMONY - VOLUME V ...13.0006

LONG-PERIOD WAVES AND SURGES ...13.0019

SHORE EROSION STUDY OF ERIE COUNTY, OHIO  
...15.0030

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

## **Water Cycle**

FIRE ON A FOREST SOIL. ...5.0047

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN  
FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA  
...6.0074

## **Water Demand**

*See Water Resources Management*

## **Water Deposited Clastics**

*See Sedimentology  
Sedimentary Rocks*

## **Water Drawdown**

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062

INVESTIGATION OF RED RIVER VALLEY GEOLOGY -  
EFFECTS ON STRUCTURE DESIGN AND PER-  
FORMANCE ...9.0018

## **Water Infiltration**

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO

LAKE HYDROLOGY ...6.0207

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230

SPACE-TIME VARIATIONS IN HIGH INTENSITY RAIN-  
FALL ON THE WINDWARD COAST OF THE ISLAND OF  
HAWAII (PHASE III) ...6.0246

PREDICTION OF THE MAGNITUDES AND FREQUENCIES  
OF FLOODS IN MICHIGAN ...6.0299

STUDY OF FLOOD HYDROGRAPHS FOR SMALL  
DRAINAGE BASINS IN WYOMING ...6.0415

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...9.0045

## **Water Law**

*See Law & Water*

## **Water Level Fluctuation**

STRUCTURAL MODEL TESTS OF EARTHQUAKE EF-  
FECTS (ES 047) ...3.0065

COLLECTION AND ANALYSIS OF STREAM FLOW AND  
RELATED HYDRAULIC DATA FOR DESIGN OF  
HIGHWAY BRIDGES AND CULVERTS - IOWA ...6.0064

RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE  
COUNTY, FLORIDA ...6.0069

NUTWOOD WATERSHED, ILLINOIS ...6.0199

LAKE HYDROLOGY ...6.0207

INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION  
TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209

GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230

HYDROGRAPH MODEL STUDIES OF THE HILL-  
SBOROUGH, ALAFIA, AND ANCIOTE RIVER BASINS,  
FLORIDA ...6.0234

HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL  
FLOOD CONTROL ON THE IOWA RIVER, IOWA  
...6.0273

FLOOD PROFILES OF IOWA STREAMS ...6.0274

STREAMFLOW SIMULATION AND FLOOD PROFILE  
DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA ...6.0357

SURVEY OF LAKE FLOODING FROM ERTS-1 - LAKE  
CHAMPLAIN ...6.0393

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

COASTAL STORM DAMAGE WITH SPECIAL REFERENCE  
TO THE DELMARVA REGION OF DELAWARE MARY-

CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT 10.0013  
 ARIZONA EARTH FISSURE INVESTIGATION 10.0014  
 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA 13.0001  
 LONG-PERIOD WAVES AND SURGES 13.0019  
 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS 13.0025  
 PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDEPLATS' IN IOWA'S LARGE RESERVOIR SYSTEMS 15.0008  
 NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT 15.0019  
 SHORE EROSION STUDY OF ERIE COUNTY, OHIO 15.0030  
 REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974 16.0040  
 REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD 16.0041

### Water Level Recorders

*See Techniques and Instrumentation  
 Gaging*

### Water Loss

*See Water Supply*

### Water Motion Recorders

*See Oceanography  
 Oceanographic Instrumentation  
 See Techniques and Instrumentation  
 Gaging*

### Water Properties

*See Water Quality*

### Water Quality

THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY 2.0018  
 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII 6.0076

NORTH CAROLINA 6.0137  
 PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA 6.0168  
 NORTH RICHMOND - SAN PABLO BAY AREA STUDY, CALIFORNIA 6.0178  
 THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT 6.0240  
 HAWAII ENVIRONMENTAL SIMULATION MODEL 6.0252  
 NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS 6.0258  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS 6.0265  
 STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS 6.0335  
 APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA 6.0351  
 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS 6.0372  
 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN 6.0373  
 WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) 6.0379  
 URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS 6.0383  
 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS 6.0386  
 VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS 6.0387  
 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS 6.0389  
 JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK 8.0119  
 DENVER URBAN CORRIDOR STUDIES - COLORADO 10.0020  
 PATH OF POLLUTANTS  
 ESTUARINE HYDROLOGY OF TAMPA BAY 6.0071  
 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES 6.0119  
 TRAVEL TIME OF GEORGIA STREAMS 6.0241  
 OPERATION AGNIES 8.0135  
 REMOTE SENSING, ALFAFIA AND PEACE RIVER BASINS, FLORIDA 10.0029  
 SAN FRANCISCO BAY 15.0013

## POLLUTION EFFECTS

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067

STUDIES OF THE RED ALGAE IN BISCAYNE BAY ...6.0070

OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS ...6.0086

LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT ...6.0098

NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT ...6.0111

RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408

OPERATION AGNES ...8.0135

BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE ...15.0010

DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS ...15.0018

## POLLUTION SOURCES

ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071

THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) ...14.0015

SHORE EROSION STUDIES ALONG THE OHIO SHORE OF LAKE ERIE ...15.0032

## Agricultural Chemicals

OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380

OPERATION AGNES ...8.0135

## Effluents - Waste Water

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...6.0185

SOCIALLY DEFINED ENVIRONMENTAL VALUES IN URBAN WATER RESOURCES PLANNING ...6.0191

## Forest Debris

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...6.0041

DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES ...6.0165

OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380

## Mining Activities

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338

## Natural Sources

APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES ...6.0164

DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES ...6.0165

## Nutrients

OPERATION AGNES ...8.0135

## Organic Matter

SAN FRANCISCO BAY ...15.0013

## Petroleum Wastes

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS ...6.0298

ANALYTICAL PHYSICAL MODEL ...8.0126

## Plant Pollutants

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

## Radioactive Fallout

METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER ...16.0105

## Saline Water Intrusion

BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT ...2.0014

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

## Sanitary Landfills

EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...3.0179

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO ...3.0185

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...6.0185

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...6.0221

SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040

WHITEWATER CREEK HYDROLOGIC UNIT PROJECT  
MEASURE, CHEROKEE HILLS RC AND D PROJECT,  
OKLAHOMA ...6.0206

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

OPERATION AGNES ...8.0135

DEPOSITION OF HAWAIIAN WATERSHED AND  
ESTUARINE SEDIMENTS ...15.0018

#### *Sewage*

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND  
PUBLIC ACTION FOR LOCAL AND REGIONAL WATER  
CONSERVATION ...6.0051

DEVELOPMENT OF A FLOOD AND POLLUTION CON-  
TROL PLAN FOR THE CHICAGOLAND AREA - COM-  
PUTER SIMULATION PROGRAMS ...6.0083

RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS ...6.0112

WATER RELATED ENVIRONMENTAL SERVICES ...6.0133

OSO CREEK TECHNICAL ASSISTANCE STUDY -  
PRELIMINARY STUDY ON THE PROBLEMS AND OP-  
PORTUNITIES FOR DEVELOPMENT OF OSO CREEK  
AND OSO BAY ...6.0380

ANALYTICAL PHYSICAL MODEL ...8.0126

#### *Thermal Pollution*

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

ANALYTICAL PHYSICAL MODEL ...8.0126

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

#### *Underground Waste Disposal*

EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER  
STRUCTURES SURROUNDED BY WATER ...3.0034

DENVER EARTHQUAKES ...3.0217

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

EARTHQUAKES INDUCED BY UNDERGROUND FLUID  
INJECTION ...3.0272

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
...6.0185

#### *POTABLE WATER*

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014

GEOLOGY ...9.0050

#### *Chemical*

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...6.0221

ANALYTICAL PHYSICAL MODEL ...8.0126

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

#### *Color*

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
STUDY ...6.0310

#### *Depth*

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255

STREAMFLOW SIMULATION AND FLOOD PROFILE  
DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

#### *Electrical*

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

#### *Ions & Gases in Water*

ANALYTICAL PHYSICAL MODEL ...8.0126

#### *Mineral Content*

OPERATION AGNES ...8.0135

SAN FRANCISCO BAY ...15.0013

#### *Organic*

EFFECT OF PRESCRIBED BURNING ON WATER YIELD  
AND QUALITY FROM BRUSH INFESTED LANDS -  
TEXAS ...5.0022

#### *Physical*

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...6.0221

ANALYTICAL PHYSICAL MODEL ...8.0126

#### *Salinity*

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

EFFECTS OF TROPICAL STORM AGNES ON THE UPPER  
CHESAPEAKE BAY AND SELECTED TRIBUTARIES  
...8.0009

TEXAS COAST HURRICANE SURGE MODEL STUDIES  
...8.0013

EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HUR-  
RICANE SURGE CONTROL STRUCTURES AND MISSIS-  
SIPPI RIVER-GULF OUTLET CHANNEL ...8.0048

ANALYTICAL PHYSICAL MODEL ...8.0126

#### *Temperature*

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

A METHODOLOGY STUDY TO DEVELOP EVALUATION  
CRITERIA FOR WILD AND SCENIC RIVERS - REPORT  
ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

WABASH RIVER SYSTEMS MODELS FOR PROJECT  
MANAGEMENT, PLANNING AND EVALUATION  
...6.0271

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

ANALYTICAL PHYSICAL MODEL ...8.0126

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

#### *Turbidity*

OPERATION AND MAINTENANCE OF NEW BEDFORD  
HURRICANE BARRIER, MASSACHUSETTS ...6.0109

JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL  
AND HURRICANE PROTECTION ...15.0007

#### *WATER QUALITY CONTROL*

ELEMENTS OF THE WATER RESOURCES SITUATION IN  
ALABAMA ...6.0035

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

DEVELOPMENT OF A FLOOD AND POLLUTION CON-  
TROL PLAN FOR THE CHICAGOLAND AREA - COM-  
PUTER SIMULATION PROGRAMS ...6.0083

RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS ...6.0112

FACTORS PERTINENT TO WATER QUALITY IN THE AL-  
BUQUERQUE METROPOLITAN AREA ...6.0128

BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142

A PROGRAM FOR METROPOLITAN WATER MANAGE-  
MENT ...6.0243

ATLANTA METROPOLITAN AREA URBAN FLOOD RU-  
NOFF CHARACTERISTICS - GEORGIA ...6.0244

ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS  
...6.0324

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

DEVELOPMENT OF WATER RESOURCE MANAGEMENT  
METHODS - TENNESSEE ...6.0367

#### *Baseline Studies*

STUDIES OF THE RED ALGAE IN BISCAYNE BAY  
...6.0070

TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS  
AND TESTIMONY - VOLUME V ...13.0006

SHORE EROSION STUDY OF LAKE COUNTY, OHIO  
...15.0031

#### *Desalination*

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

#### *Filtration*

LABORATORY STUDIES OF CONSERVATION AND  
DRAINAGE STRUCTURES ...6.0085

#### *Pollution Abatement*

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN  
URBAN AREAS ...6.0220

#### *Water Standards*

STANDARDS FOR PLANNING WATER AND LAND  
RESOURCES ...6.0223

URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV) ...6.0308

#### *Water Quantity Studies*

*See Water Supply*

#### *Water Resources Development*

*See Water Resources Management*

#### *Water Resources Economics*

*See Economics*

FLORIDA ...6.0066  
CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073  
DETERMINATION OF DECISION MAKING PROCESSES IN WATER RESOURCE PLANNING AND DEVELOPMENT - THE CONNECTICUT RIVER BASIN ...6.0292  
LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294  
REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I ...6.0334  
THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

#### ALTERNATIVE PLANNING

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017  
THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES ...6.0019  
STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031  
WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS ...6.0036  
RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038  
DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO ...6.0046  
A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION ...6.0051  
CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION ...6.0053  
AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066  
HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067  
CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073  
DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGO LAND AREA - COMPUTER SIMULATION PROGRAMS ...6.0083  
ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT-A CASE STUDY - TEXAS ...6.0151  
PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154  
STOCHASTIC HYDROLOGY ...6.0167  
COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS ...6.0173

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182  
IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS ...6.0218  
DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220  
STANDARDS FOR PLANNING WATER AND LAND RESOURCES ...6.0223  
HAWAII ENVIRONMENTAL SIMULATION MODEL ...6.0252  
DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288  
ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291  
SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306  
COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332  
STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335  
THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336  
COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345  
APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN ...6.0346  
ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...6.0359  
TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING ...6.0378  
PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397  
COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS ...10.0001

#### CONTROL AND PROTECTION

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007  
FLOOD FREQUENCY AND HIGH-FLOW STUDIES ...6.0023  
RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038  
A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION ...6.0051  
AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA ...6.0066  
HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067



FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153

FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161

LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162

URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169

INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES ...6.0189

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

NUTWOOD WATERSHED, ILLINOIS ...6.0199

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220

IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

FLOOD PLAIN MAPPING IN HAWAII ...6.0250

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0280

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN ...6.0294

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335

COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR ...6.0360

DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA ...6.0397

URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA ...6.0401

LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012

SHORE EROSION STUDY OF LAKE COUNTY, OHIO ...15.0031

SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA ...15.0039

#### FEDERAL GOVERNMENT

ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...2.0021

INITIAL WATER, SEWERAGE AND FLOOD ...6.0047

THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

#### FLOOD CONTROL PLANNING

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007

BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971 ...3.0005

FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT ...6.0004

CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM ...6.0007

UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL ...6.0017

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES ...6.0019

STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031

SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA ...6.0033

WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS ...6.0036

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038

DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO ...6.0046

INITIAL WATER, SEWERAGE AND FLOOD ...6.0047

FLOOD PROTECTION AT CULVERT OUTLETS ...6.0050

REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD ...6.0052

CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION ...6.0053

JACKSON HOLE FLOOD CONTROL PROJECT ...6.0054

- HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067
- RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068
- HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA ...6.0069
- ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT ...6.0072
- CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III ...6.0073
- CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074
- A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080
- DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA - COMPUTER SIMULATION PROGRAMS ...6.0083
- BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS ...6.0084
- DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970 ...6.0087
- STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090
- FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091
- STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV) ...6.0092
- HYDROLOGIC STUDIES (STORM STUDIES) ...6.0095
- NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION ...6.0097
- LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT ...6.0098
- RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS ...6.0100
- THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS ...6.0101
- FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN ...6.0105
- HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT ...6.0108
- RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112
- FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113
- SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115
- DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116
- SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122
- OPTIMIZATION OF OPERATION OF A SYSTEM OF FLOOD CONTROL RESERVOIRS ...6.0123
- FLOOD WAVES FROM A CONTROLLED BREACHED DAM ...6.0124
- DEVELOPMENT OF AN OPERATIONS MODEL FOR MON. TANA'S WATER RESOURCES, MIDDLE CREEK RESERVOIR OPERATION ...6.0126
- PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J. ...6.0127
- FACTORS PERTINENT TO WATER QUALITY IN THE ALBUQUERQUE METROPOLITAN AREA ...6.0128
- INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129
- REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130
- USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM ...6.0131
- AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132
- WATER RELATED ENVIRONMENTAL SERVICES ...6.0133
- BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141
- TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN ...6.0143
- COMPREHENSIVE PLAN, CITY OF HAMILTON, TEXAS ...6.0148
- OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING ...6.0150
- ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151
- PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS ...6.0152
- MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153
- PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154
- STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA ...6.0157
- FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160
- FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161
- SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT ...6.0172
- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS ...6.0173

- DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SUMMARY REPORT ...6.0181
- INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES ...6.0189
- SOCIALLY DEFINED ENVIRONMENTAL VALUES IN URBAN WATER RESOURCES PLANNING ...6.0191
- KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0195
- UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA ...6.0196
- HOLLOW CREEK WATERSHED PROJECT, SOUTH CAROLINA ...6.0197
- KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198
- NUTWOOD WATERSHED, ILLINOIS ...6.0199
- HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY ...6.0200
- CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO ...6.0201
- BIG CREEK WATERSHED, KANSAS ...6.0202
- MACADOO ROAD-FILL DAM, KANSAS ...6.0203
- STARKWEATHER WATERSHED, NORTH DAKOTA ...6.0204
- VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205
- WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA ...6.0206
- LAKE HYDROLOGY ...6.0207
- IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS ...6.0218
- GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230
- MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233
- HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA ...6.0234
- FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE ...6.0235
- FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236
- SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238
- TRAVEL TIME OF GEORGIA STREAMS ...6.0241
- WATER RESOURCES OF MIDDLE GEORGIA ...6.0245
- SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246
- HYDROLOGIC RELATIONS IN HAWAII ...6.0247
- FLOOD PLAIN MAPPING IN HAWAII ...6.0250
- THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273
- FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0280
- FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY ...6.0286
- ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES ...6.0291
- DETERMINATION OF DECISION MAKING PROCESSES IN WATER RESOURCE PLANNING AND DEVELOPMENT - THE CONNECTICUT RIVER BASIN ...6.0292
- AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300
- FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301
- THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT ...6.0302
- FLOOD PLAIN STUDIES--MINNESOTA ...6.0304
- FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305
- SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306
- CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310
- CITY OF JACKSON WATER RESOURCES STUDY ...6.0311
- MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY ...6.0312
- FORT SCOTT LAKE, MARMATON RIVER, KANSAS ...6.0315
- HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317
- STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS ...6.0318
- EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY ...6.0322
- ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS ...6.0324
- THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328
- FLOOD INVESTIGATIONS - NEW YORK ...6.0331
- REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I ...6.0334
- STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335
- THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

- RESOURCES OF OKLAHOMA ...6.0351
- A COMPILATION OF FLOOD ABATEMENT PROJECTS IN OREGON ...6.0353
- THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357
- FLOOD-PROOFING REGULATIONS ...6.0358
- ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS ...6.0359
- SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR ...6.0360
- FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO ...6.0362
- DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367
- BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368
- URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372
- URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373
- URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377
- OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380
- URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384
- DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS OF URBAN AREAS ...6.0390
- TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS ...6.0394
- PILOT STUDY OF FLOOD PLAIN MANAGEMENT - WASHINGTON ...6.0402
- HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN ...6.0408
- FLOOD INUNDATION STUDY, WISCONSIN ...6.0409
- STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415
- LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS ...10.0012
- REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974 ...16.0040
- LAND USE
- DROUGHT IN KANSAS ...2.0013
- ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017
- ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA ...3.0109
- SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS, IDAHO ...3.0185
- SEISMIC HAZARDS AND LAND-USE PLANNING ...3.0197
- EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA ...6.0013
- URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018
- PENN-SUSQUEHANNA URBAN RENEWAL PROJECT, HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-634C ...6.0026
- MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY ...6.0030
- EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039
- HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067
- CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074
- DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA - COMPUTER SIMULATION PROGRAMS ...6.0083
- PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119
- STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA ...6.0157
- A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION ...6.0158
- FLOOD MANAGEMENT STUDY ...6.0159
- FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 ...6.0160
- LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW ...6.0162
- THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166
- PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168
- URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169
- GLENDORA, CALIFORNIA, GENERAL PLAN 1990 ...6.0170
- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS ...6.0173
- COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION ...6.0174
- PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A

GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179

DENVER METROPOLITAN AREA, COLORADO ...6.0184

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT ...6.0192

ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194

UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA ...6.0196

NUTWOOD WATERSHED, ILLINOIS ...6.0199

STANDARDS FOR PLANNING WATER AND LAND RESOURCES ...6.0223

NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL REPORT, FISCAL YEAR 1971 ...6.0227

OHIO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U. S. WATER RESOURCES COUNCIL (AB-BREV) ...6.0228

GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230

ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA ...6.0232

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 ...6.0236

IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA ...6.0237

SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238

THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY ...6.0239

THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240

THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242

NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS ...6.0258

A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS ...6.0260

THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270

ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE ...6.0272

THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA ...6.0273

FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA ...6.0275

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281

DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288

AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN ...6.0300

THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT ...6.0302

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER ...6.0305

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306

ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI ...6.0309

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332

NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE ...6.0333

APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN ...6.0337

URBAN RUNOFF ...6.0339

COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971 ...6.0350

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351

FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO ...6.0362

MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN ...6.0363

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

ZONING ORDINANCE, HUNTINGDON, TENNESSEE ...6.0369

OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY ...6.0380

SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS ...6.0381

RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS ...6.0388

FLOOD DAMAGE ADJUSTMENT - FLOOD INSURANCE  
TO LOCAL GOVERNMENT ...6.0398

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

COASTAL STORM DAMAGE WITH SPECIAL REFERENCE  
TO THE DELMARVA REGION OF DELAWARE, MARY-  
LAND, VIRGINIA ...8.0002

SANTA CRUZ COUNTY COOP. ...9.0027

GEOLOGY OF THE POINT DUME QUADRANGLE AND  
THE LOS ANGELES COUNTY PART OF THE TRIUNFO  
PASS QUADRANGLE, LOS ANGELES CO. COOPERA-  
TIVE, CALIFORNIA ...9.0029

GEOLOGY OF THE POINT BONITA QUADRANGLE,  
CALIFORNIA ...9.0032

MALIBU BEACH QUADRANGLE AND THE UNINCOR-  
PORATED PART OF THE TOPANGA QUADRANGLE,  
LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA  
...9.0034

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO  
...9.0040

SURFICIAL GEOLOGY OF JUNEAU AND VICINITY  
URBAN AREA, ALASKA ...9.0043

HAMILTON 2 DEGREE ...9.0048

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND  
GEOLOGY ...9.0050

LANDSLIPS IN SOUTHEASTERN OHIO ...9.0057

DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020

NATIONAL SHORELINE STUDY - INVENTORY REPORT -  
LOWER MISSISSIPPI REGION ...15.0021

GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE  
PLANNING, CALIFORNIA ...16.0055

SOIL ENGINEERING RESEARCH - CALIFORNIA ...16.0056

PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION  
ENVIRONMENT AND RESOURCES PLANNING STUDY  
...16.0075

#### MANAGEMENT

ECONOMIC EVALUATION OF USE AND DEVELOPMENT  
OF WATER AND LAND RESOURCES ...2.0017

AN OPTIMUM WATER ALLOCATION MODEL BASED ON  
AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN -  
FLORIDA ...6.0066

RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068

HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE  
COUNTY, FLORIDA ...6.0069

ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER  
MANAGEMENT ...6.0072

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN  
AN URBAN AREA - PHASE III ...6.0073

RESOURCE PLANNING AND MANAGEMENT IN  
NORTH CAROLINA ...6.0137

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC  
FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153

FLOOD MANAGEMENT STUDY - TUSCALOOSA,  
PICKENS COUNTY AND MOUNDSVILLE, ALABAMA,  
MAY 1971 ...6.0160

STOCHASTIC HYDROLOGY ...6.0167

SEA COAST PLANNING PROJECT - CALIFORNIA ...6.0182

SOCIALLY DEFINED ENVIRONMENTAL VALUES IN  
URBAN WATER RESOURCES PLANNING ...6.0191

STARKWEATHER WATERSHED, NORTH DAKOTA  
...6.0204

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN  
URBAN AREAS ...6.0220

A UNIFORM TECHNIQUE FOR DETERMINING FLOOD  
FLOW FREQUENCIES ...6.0224

NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL  
REPORT, FISCAL YEAR 1971 ...6.0227

ZONING REGULATIONS OF THE CITY OF SARASOTA,  
FLORIDA ...6.0232

IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237

TRAVEL TIME OF GEORGIA STREAMS ...6.0241

A PROGRAM FOR METROPOLITAN WATER MANAGE-  
MENT ...6.0243

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES  
- AN APPROACH TO FLOOD PLAIN MANAGEMENT  
...6.0257

AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE  
STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND  
OHIO ...6.0266

HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267

WABASH RIVER SYSTEMS MODELS FOR PROJECT  
MANAGEMENT, PLANNING AND EVALUATION  
...6.0271

FLOOD PROFILES & FLOOD-PLAIN INFORMATION,  
CEDAR RAPIDS, IOWA ...6.0276

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION  
FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR  
FALLS, IOWA ...6.0277

DATA AND MANAGEMENT NEEDS FOR WATER RE-  
LATED LAND AREAS - MAINE ...6.0288

LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE  
CONNECTICUT RIVER FLOOD PLAINS ...6.0293

LEGAL FACTORS IN ECONOMETRIC MODELING OF  
LOCAL FLOODPLAIN MANAGEMENT DEVICES IN  
THE CONNECTICUT RIVER BASIN ...6.0294

THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE  
OF THE LOWER MINNESOTA RIVER WATERSHED DIS-  
TRICT ...6.0302

FLOOD PLAIN STUDIES-MINNESOTA ...6.0304

FLOOD PLAIN MANAGEMENT STUDIES - LOWER MIN-  
NESOTA RIVER ...6.0305

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I ...6.0334

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335

THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336

APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN ...6.0337

URBAN RUNOFF ...6.0339

COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN ...6.0346

DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM ...6.0347

DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS OF URBAN AREAS ...6.0390

SURVEY OF LAKE FLOODING FROM ERTS-1 - LAKE CHAMPLAIN ...6.0393

FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT ...6.0398

PILOT STUDY OF FLOOD PLAIN MANAGEMENT - WASHINGTON ...6.0402

WATER RESOURCES POLICY IN WISCONSIN - VOLUME IV - FLOOD PLAIN MANAGEMENT ...6.0410

REMOTE SENSING FOR RESOURCE MANAGEMENT AND FLOOD PLAIN DELINEATION ...6.0412

ANALYTICAL PHYSICAL MODEL ...8.0126

REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY ...9.0050

CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA ...10.0032

EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO ...14.0011

COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES ...15.0026

RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I ...6.0154

PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV) ...6.0175

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

#### Non-STRUCTURAL ALTERNATIVES

SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS ...6.0238

DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE ...6.0288

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306

REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I ...6.0334

COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

#### PLANNING

HYDROLOGIC SYSTEMS MODELING AND SIMULATION ...2.0007

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017

OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK ...3.0102

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES ...6.0019

PENN-SUSQUEHANNA URBAN RENEWAL PROJECT, HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-634C ...6.0026

STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038

EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

INITIAL WATER, SEWERAGE AND FLOOD ...6.0047

INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL ...6.0088

PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119

...6.0130  
 USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF  
 WATER RESOURCES MANAGEMENT PLANS FOR NEW  
 YORK STATE - ADDENDUM ...6.0131  
 AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132  
 USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER  
 RESOURCE PLANNING AND MANAGEMENT IN  
 NORTH CAROLINA ...6.0137  
 ALTERNATE SOLUTIONS TO WATER RESOURCE  
 DEVELOPMENT-A CASE STUDY - TEXAS ...6.0151  
 PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
 SYSTEMS - PHASE I ...6.0154  
 FLOODWAY EVALUATIONS BEFORE & AFTER CHAN-  
 NEL MODIFICATIONS ASSUAGING TOTAL  
 METROPOLITAN DEVELOPMENT IN DRAINAGE  
 BASINS JEFFERSON COUNTY, ALABAMA ...6.0161  
 STOCHASTIC HYDROLOGY ...6.0167  
 PERRIS VALLEY URBAN HYDROLOGY STUDY,  
 CALIFORNIA ...6.0168  
 GLENDORA, CALIFORNIA, GENERAL PLAN 1990  
 ...6.0170  
 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN  
 DEVELOPMENT - PART I - LAND USE PLANNING AND  
 BENEFIT EVALUATION ...6.0174  
 PLAN FORMULATION AND EVALUATION IN MULTIPLE  
 PURPOSE WATER RESOURCE PROJECT - A  
 FRAMEWORK FOR REGIONAL PLANNING (ABBREV)  
 ...6.0175  
 NORTH RICHMOND - SAN PABLO BAY AREA STUDY -  
 CALIFORNIA ...6.0178  
 GENERAL PLAN REPORT, LAKE RED BLUFF AREA,  
 CALIFORNIA, 1971 ...6.0179  
 DRAINAGE AND FLOOD CONTROL BACKGROUND AND  
 POLICY STUDY - SUMMARY REPORT ...6.0181  
 SOCIALLY DEFINED ENVIRONMENTAL VALUES IN  
 URBAN WATER RESOURCES PLANNING ...6.0191  
 RECOMMENDED REGIONAL PLAN FOR SEWERAGE,  
 WATER SUPPLY AND STORM DRAINAGE - CONNEC-  
 TICUT ...6.0192  
 ANALYSIS OF LAND USE CONTROL MEASURES ...6.0194  
 STANDARDS FOR PLANNING WATER AND LAND  
 RESOURCES ...6.0223  
 FLOOD HAZARD EVALUATION GUIDELINES FOR  
 FEDERAL EXECUTIVE AGENCIES ...6.0225  
 SYNTHESIZING A PROCEDURE FOR FORMULATING  
 URBAN FLOOD CONTROL PROGRAMS ...6.0238  
 TRAVEL TIME OF GEORGIA STREAMS ...6.0241  
 WATER RESOURCES OF MIDDLE GEORGIA ...6.0245  
 HAWAII ENVIRONMENTAL SIMULATION MODEL  
 ...6.0252  
 DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
 ...6.0255  
 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY,  
 ILLINOIS ...6.0260  
 MANAGEMENT, PLANNING AND EVALUATION  
 ...6.0271  
 FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
 CEDAR RAPIDS, IOWA ...6.0279  
 FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY  
 ...6.0286  
 DATA AND MANAGEMENT NEEDS FOR WATER RE-  
 LATED LAND AREAS - MAINE ...6.0288  
 DETERMINATION OF DECISION MAKING PROCESSES IN  
 WATER RESOURCE PLANNING AND DEVELOPMENT -  
 THE CONNECTICUT RIVER BASIN ...6.0292  
 SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE  
 WATER RESOURCES POLICIES IN MINNESOTA  
 ...6.0306  
 URBAN SYSTEMS - WATERWORKS, SANITARY  
 SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
 DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
 BREV) ...6.0308  
 CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
 STUDY ...6.0310  
 HYDROLOGY OF STREAMS IN ST. LOUIS  
 METROPOLITAN AREA ...6.0317  
 STORAGE REQUIREMENTS TO CONTROL FLOOD  
 FLOWS OF MISSOURI STREAMS ...6.0318  
 FLOODPLAIN MAPPING AND PLANNING FOR THE 50  
 AND 100 YEAR INTERVAL FLOOD ZONES OF THE  
 BITTERROOT VALLEY, MONTANA ...6.0321  
 ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS  
 ...6.0324  
 DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES,  
 & FLOOD INUNDATION - NEW JERSEY ...6.0326  
 THE USE OF SYSTEMS ANALYSIS IN THE DEVELOP-  
 MENT OF WATER RESOURCES MANAGEMENT PLANS  
 FOR NEW YORK STATE - VOLUME I ...6.0328  
 PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR  
 REVISION AND EXPANSION ...6.0330  
 FLOOD INVESTIGATIONS - NEW YORK ...6.0331  
 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTA-  
 TION - VILLAGE OF EAST AURORA, N.Y., TOWN OF  
 AURORA, N.Y. ...6.0332  
 THE POLITICAL ECONOMY OF WATER RESOURCES  
 ...6.0336  
 APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN  
 ANALYSIS AND MANAGEMENT IN THE SUSQUEHAN-  
 NA RIVER BASIN ...6.0337  
 DETERMINATION OF COST-EFFECTIVE TECHNICAL  
 PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN  
 MANAGEMENT PROGRAM ...6.0347  
 APPRAISAL OF THE WATER AND RELATED LAND  
 RESOURCES OF OKLAHOMA - REGION EIGHT - 1971  
 ...6.0350  
 APPRAISAL OF THE WATER AND RELATED LAND  
 RESOURCES OF OKLAHOMA ...6.0351  
 MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOP-  
 MENT PLAN ...6.0363



OSO CREEK TECHNICAL ASSISTANCE STUDY -  
PRELIMINARY STUDY ON THE PROBLEMS AND OP-  
PORTUNITIES FOR DEVELOPMENT OF OSO CREEK  
AND OSO BAY ...6.0380

PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMA-  
RY REPORT ...6.0385

FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE  
TO LOCAL GOVERNMENT ...6.0398

PILOT STUDY OF FLOOD PLAIN MANAGEMENT -  
WASHINGTON ...6.0402

WATER RESOURCES POLICY IN WISCONSIN - VOLUME  
IV - FLOOD PLAIN MANAGEMENT ...6.0410

REMOTE SENSING FOR RESOURCE MANAGEMENT AND  
FLOOD PLAIN DELINEATION ...6.0412

REMOTE SENSING FOR GEOLOGIC HAZARDS AND DIS-  
ASTERS, MINE AREA CONSERVATION, SOIL MAPPING  
AND LAND USE PLANNING ...9.0035

EASTERN SNAKE RIVER PLAIN REGION INVESTIGA-  
TIONS - IDAHO ...14.0011

SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS -  
IDAHO ...14.0013

COASTAL ZONE AND SHORELANDS MANAGEMENT -  
GREAT LAKES ...15.0026

#### PROJECT POST-EVALUATION

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL  
...6.0038

AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132

COMPUTER SIMULATION MODEL FOR FLOOD PLAIN  
DEVELOPMENT - PART I - LAND USE PLANNING AND  
BENEFIT EVALUATION ...6.0174

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES  
- AN APPROACH TO FLOOD PLAIN MANAGEMENT  
...6.0257

AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE  
STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND  
OHIO ...6.0266

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMA-  
RY REPORT ...6.0385

#### PROJECTIONS AND ESTIMATIONS

ECONOMIC EVALUATION OF USE AND DEVELOPMENT  
OF WATER AND LAND RESOURCES ...2.0017

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

THE GENERATION OF FLOOD DAMAGE TIME  
SEQUENCES ...6.0019

INITIAL WATER, SEWERAGE AND FLOOD ...6.0047

PEAK DISCHARGE AND FREQUENCY FOR SMALL  
WATERSHEDS IN COLORADO ...6.0049

SMALL RURAL WATERSHEDS ...6.0177

FLOOD FREQUENCY IN URBAN AREAS - COLORADO  
...6.0187

HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS  
- INDIANA ...6.0208

FLOOD-FREQUENCY AND BASIN PARAMETER RELA-  
TIONSHPIS IN SMALL DRAINAGE AREAS ...6.0215

TRAVEL TIME OF GEORGIA STREAMS ...6.0241

WATER RESOURCES OF MIDDLE GEORGIA . 6.0245

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255

COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES  
- AN APPROACH TO FLOOD PLAIN MANAGEMENT  
...6.0257

FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS  
- IOWA ...6.0278

OPSET - PROGRAM FOR COMPUTERIZED SELECTION  
OF WATERSHED PARAMETER VALUES FOR THE  
STANFORD WATERSHED MODEL ...6.0285

PROBABLE MAXIMUM PRECIPITATION AND SNOW-  
MELT CRITERIA FOR RED RIVER OF THE NORTH  
ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT,  
NORTH DAKOTA ...6.0290

FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS  
...6.0349

TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES  
FOR WATER RESOURCE PLANNING ...6.0378

#### SOCIAL ASPECTS

SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EF-  
FECTS ...6.0003

FLOOD INSURANCE STUDY ...6.0006

THE METEOROLOGICAL AND HYDROLOGICAL  
ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS  
...6.0022

CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN  
AN URBAN AREA - PHASE III ...6.0073

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC  
FLOW SYSTEM OF URBAN AREAS - PHASE III ...6.0153

PRESENT AND POTENTIAL MULTIPLE USES OF CANAL  
SYSTEMS - PHASE I ...6.0154

SOCIALLY DEFINED ENVIRONMENTAL VALUES IN  
URBAN WATER RESOURCES PLANNING ...6.0191

IMPLICATIONS OF ZONING AS AN URBAN WATER  
MANAGEMENT MEASURE - GEORGIA ...6.0237

SYNTHESIZING A PROCEDURE FOR FORMULATING  
URBAN FLOOD CONTROL PROGRAMS ...6.0238

A PROGRAM FOR METROPOLITAN WATER MANAGE-  
MENT ...6.0243

ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE  
FLOOD CONTROL STRATEGIES ...6.0291

AGNES - PHASE I ...6.0334  
THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

COST-EFFECTIVENESS ANALYSES OF REGIONAL  
FLOOD PLAIN MANAGEMENT ACTIVITIES ...6.0345

SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESER-  
VOIR ...6.0360

WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL  
SYSTEM RELATED TO DRAINAGE PROBLEMS OF  
URBAN AREAS ...6.0390

PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS  
AND COSTS OF FLOOD PLAIN REGULATION - VIR-  
GINIA ...6.0397

FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA  
...6.0399

A COMPARATIVE ANALYSIS OF PUBLIC SUPPORT OF  
AND RESISTANCE TO WEATHER MODIFICATION PRO-  
JECTS ...16.0061

#### STATE - LOCAL GOVERNMENTS

PRIORITY AND PLANNING ELEMENTS FOR DEVELOP-  
ING ILLINOIS WATER RESOURCES ...6.0262

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
CEDAR RAPIDS, IOWA ...6.0279

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION,  
LINN COUNTY, IOWA ...6.0280

DATA AND MANAGEMENT NEEDS FOR WATER RE-  
LATED LAND AREAS - MAINE ...6.0288

SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE  
WATER RESOURCES POLICIES IN MINNESOTA  
...6.0306

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

#### USER SURVEYS

BACKGROUND SURVEY - SURFACE DRAINAGE PRO-  
GRAM, MADISON, ST. CLAIR, MONROE AND RAN-  
DOLPH COUNTIES, ILLINOIS ...6.0084

OHIO RIVER BASIN SURVEY, MAIN REPORT &  
DEVELOPMENT PROGRAM, COMMUNICATION FROM  
CHAIRMAN, U. S. WATER RESOURCES COUNCIL (AB-  
BREV) ...6.0228

FLOOD PLAIN MAPPING IN HAWAII ...6.0250

DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS  
...6.0255

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

HYDROLOGY OF STREAMS IN ST. LOUIS  
METROPOLITAN AREA ...6.0317

URBAN HYDROLOGY STUDY - DALLAS COUNTY,  
TEXAS ...6.0384

DEFINING THE ELEMENTS OF THE SOCIOLOGICAL  
SYSTEM RELATED TO DRAINAGE PROBLEMS OF  
URBAN AREAS ...6.0390

PILOT STUDY OF FLOOD PLAIN MANAGEMENT -  
WASHINGTON ...6.0402

FLOOD INUNDATION STUDY, WISCONSIN ...6.0409

WATER RESOURCES POLICY IN WISCONSIN - VOLUME  
IV - FLOOD PLAIN MANAGEMENT ...6.0410

#### WATER DEMAND

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

EARTHQUAKES RELATED TO RESERVOIR FILLING  
...3.0054

OPTIMIZATION OF WATER RESOURCE SYSTEMS IN-  
CORPORATING EARTHQUAKE RISK ...3.0102

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

INITIAL RESULTS FROM THE UPPER WABASH SIMULA-  
TION MODEL ...6.0088

WATER RESOURCES OF MIDDLE GEORGIA ...6.0245

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

#### WATER RESOURCES DEVELOPMENT

ECONOMIC EVALUATION OF USE AND DEVELOPMENT  
OF WATER AND LAND RESOURCES ...2.0017

HYDROLOGIC ENGINEERING METHODS FOR WATER  
RESOURCES DEVELOPMENT - VOLUME I - REQUIRE-  
MENTS AND GENERAL PROCEDURES ...6.0037

HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST  
FLORIDA (BIG CYPRESS) ...6.0067

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER  
RESOURCES PLANNING STUDIES IN NEW YORK  
...6.0130

RUNOFF SIMULATION ...6.0156

PLAN FORMULATION AND EVALUATION IN MULTIPLE  
PURPOSE WATER RESOURCE PROJECT - A  
FRAMEWORK FOR REGIONAL PLANNING (ABBREV)  
...6.0175

STANDARDS FOR PLANNING WATER AND LAND  
RESOURCES ...6.0223

NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL  
REPORT, FISCAL YEAR 1971 ...6.0227

OHIO RIVER BASIN SURVEY, MAIN REPORT &  
DEVELOPMENT PROGRAM, COMMUNICATION FROM  
CHAIRMAN, U. S. WATER RESOURCES COUNCIL (AB-  
BREV) ...6.0228

DETERMINATION OF DECISION MAKING PROCESSES IN  
WATER RESOURCE PLANNING AND DEVELOPMENT -  
THE CONNECTICUT RIVER BASIN ...6.0292

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOP-  
MENT OF WATER RESOURCES MANAGEMENT PLANS  
FOR NEW YORK STATE - VOLUME I ...6.0328

THE POLITICAL ECONOMY OF WATER RESOURCES  
...6.0336

APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN  
ANALYSIS AND MANAGEMENT IN THE SUSQUEHAN-  
NA RIVER BASIN ...6.0337

APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA ...6.0351

BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368

WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379

### **Water Reuse**

*See Water Supply*

### **Water Rights**

*See Law & Water*

### **Water Runoff**

BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014

INITIAL RESULTS FROM THE UPPER WABASH SIMULA-  
TION MODEL ...6.0088

SYNTHESIZING A PROCEDURE FOR FORMULATING  
URBAN FLOOD CONTROL PROGRAMS ...6.0238

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

OPSET - PROGRAM FOR COMPUTERIZED SELECTION  
OF WATERSHED PARAMETER VALUES FOR THE  
STANFORD WATERSHED MODEL ...6.0285

WATER RESOURCES OF THE RED RIVER OF THE  
NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR  
REVISION AND EXPANSION ...6.0330

HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408

EFFECTS OF DEFORESTATION ON THE STABILITY OF  
NATURAL SLOPES - OREGON, WASHINGTON ...9.0051

WATERSHEDS ...0.0313  
FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTA-  
BLE BRUHLANDS OF THE SOUTHWEST ...15.0002

### **SNOWMELT RUNOFF**

A METHODOLOGY STUDY TO DEVELOP EVALUATION  
CRITERIA FOR WILD AND SCENIC RIVERS - REPORT  
ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

RAINFALL-RUNOFF RELATIONS ON URBAN AND  
RURAL AREAS ...6.0112

FORECASTING RAINFALL AND SNOWMELT FLOODS ON  
UPPER MIDWESTERN WATERSHEDS ...6.0113

DEVELOPMENT OF AN OPERATIONS MODEL FOR MON-  
TANA'S WATER RESOURCES, MIDDLE CREEK RESER-  
VOIR OPERATION ...6.0126

DEVELOPMENT OF AN ALASKAN CONCEPTUAL  
WATERSHED MODEL ...6.0163

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

PREDICTION OF THE MAGNITUDES AND FREQUENCIES  
OF FLOODS IN MICHIGAN ...6.0299

FLOODPLAIN MAPPING AND PLANNING FOR THE 50  
AND 100 YEAR INTERVAL FLOOD ZONES OF THE  
BITTERROOT VALLEY, MONTANA ...6.0321

PHYSICAL EVALUATION OF CLOUD SEEDING  
TECHNIQUES FOR MODIFYING OROGRAPHIC SNOW-  
FALL - THE CASCADE PROJECT ...11.0007

### **STORM RUNOFF**

HYDROLOGIC SYSTEMS MODELING AND SIMULATION  
...2.0007

STUDIES IN CONNECTION WITH HYDROLOGIC AND RE-  
LATED PHYSICAL PROCESSES IN THE OLYMPUS  
COVE AREA OF SALT LAKE COUNTY ...6.0031

FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS  
- ALABAMA ...6.0034

EFFECTS OF URBAN DEVELOPMENT AND WATER USE  
ON THE SANTA ANA RIVER, CALIFORNIA ...6.0039

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFOR-  
NIA ...6.0043

SOUTH COASTAL BASIN PRECIPITATION FREQUENCY -  
A REGIONAL ANALYSIS OF DEPTH-DURATION  
FREQUENCY OF SHORT-DURATION PRECIPITATION  
IN CALIFORNIA ...6.0044

FLOOD FREQUENCY IN URBAN AREAS, COLORADO  
...6.0048

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND  
PUBLIC ACTION FOR LOCAL AND REGIONAL WATER  
CONSERVATION ...6.0051

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

FLOW REGULATION EFFECTS OF THE BURLINGTON  
RESERVOIR FROM THE DAM DOWNSTREAM TO  
WESTHOPE, NORTH DAKOTA ...6.0062

OF THE ISLANDS OF HAWAII ...6.0199  
 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082  
 FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091  
 FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094  
 FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102  
 FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106  
 RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112  
 SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115  
 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES ...6.0119  
 PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J. ...6.0127  
 INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129  
 AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132  
 WATER RELATED ENVIRONMENTAL SERVICES ...6.0133  
 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134  
 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135  
 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136  
 MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140  
 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149  
 RUNOFF SIMULATION ...6.0156  
 FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA ...6.0161  
 PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA ...6.0168  
 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169  
 CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS ...6.0171  
 FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176  
 NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA ...6.0178  
 FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180  
 NUTWOOD WATERSHED, ILLINOIS ...6.0199  
 HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA ...6.0208  
 FLOOD FREQUENCY OF ALABAMA STREAMS - ALABAMA ...6.0213  
 FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS ...6.0215  
 WATER RESOURCES INVESTIGATIONS ...6.0216  
 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222  
 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233  
 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALABAMA, AND ANCIOTE RIVER BASINS, FLORIDA ...6.0234  
 THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242  
 A PROGRAM FOR METROPOLITAN WATER MANAGEMENT ...6.0243  
 ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244  
 WATER RESOURCES OF MIDDLE GEORGIA ...6.0245  
 SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III) ...6.0246  
 HYDROLOGIC RELATIONS IN HAWAII ...6.0247  
 RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION ...6.0259  
 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265  
 HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267  
 THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270  
 EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281  
 EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282  
 SMALL STREAMS FLOOD FREQUENCY IN MAINE ...6.0287  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296  
 FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297  
 PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN ...6.0299  
 FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301  
 URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (ABBREV) ...6.0307

DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366

INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA ...6.0374

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS ...6.0375

EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA ...6.0376

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379

URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382

URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384

URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386

VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS ...6.0387

RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS ...6.0388

URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389

REGIONAL FLOOD-FREQUENCY STUDY (PHASE II) ...6.0407

STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...15.0002

LATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY ...6.0031

FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048

RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112

EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134

RUNOFF SIMULATION ...6.0156

FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187

DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS ...6.0220

THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240

ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA ...6.0244

THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

URBAN RUNOFF ...6.0339

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343

URBAN HYDROLOGY STUDY - AUSTIN, TEXAS ...6.0372

URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN ...6.0373

URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS ...6.0377

URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382

URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS ...6.0383

URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS ...6.0384

URBAN HYDROLOGY STUDY - HOUSTON, TEXAS ...6.0386

VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS ...6.0387

URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS ...6.0389

URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY ...6.0400

See Water Supply

## Water Standards

See Water Quality  
Water Quality Control

## Water Storage

See Water Supply

## Water Supply

ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA ...6.0035  
HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES ...6.0037  
HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS) ...6.0067  
INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL ...6.0088  
FACTORS PERTINENT TO WATER QUALITY IN THE ALBUQUERQUE METROPOLITAN AREA ...6.0128  
WATER RELATED ENVIRONMENTAL SERVICES ...6.0133  
BIG HILL LAKE, BIG HILL CREEK, KANSAS ...6.0141  
BIRCH LAKE, BIRCH CREEK, OKLAHOMA ...6.0142  
ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151  
RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT ...6.0192  
A PROGRAM FOR METROPOLITAN WATER MANAGEMENT ...6.0243  
COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT ...6.0257  
DETERMINATION OF DECISION MAKING PROCESSES IN WATER RESOURCE PLANNING AND DEVELOPMENT - THE CONNECTICUT RIVER BASIN ...6.0292  
CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310  
THE POLITICAL ECONOMY OF WATER RESOURCES ...6.0336  
DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE ...6.0367  
REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974 ...6.0040  
PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY ...6.0075

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263  
REMOTE SENSING, ALFAFIA AND PEACE RIVER BASINS, FLORIDA ...10.0029  
ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT ...15.0038

## AUGMENTATION

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK ...6.0130  
CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS ...6.0171  
WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION ...6.0271  
SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA ...6.0306

## CONJUNCTIVE USE

WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379

## CONSERVATION

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038  
A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION ...6.0051  
HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA ...6.0069  
LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES ...6.0085  
USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM ...6.0131  
GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179  
HOLLOW CREEK WATERSHED PROJECT, SOUTH CAROLINA ...6.0197  
KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198  
BIG CREEK WATERSHED, KANSAS ...6.0202  
STARKWEATHER WATERSHED, NORTH DAKOTA ...6.0204  
VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205  
WHITWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA ...6.0206

ION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y. ...6.0332

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS ...6.0375

SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS ...6.0381

#### SNOWMELT

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112

FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS ...6.0113

DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL ...6.0163

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA ...6.0290

PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN ...6.0299

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA ...6.0321

#### WATER ALLOCATION

ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES ...2.0017

AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMEE RIVER BASIN - FLORIDA ...6.0066

USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM ...6.0131

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

#### WATER BUDGET

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI ...2.0015

DROUGHT AND WET SPELLS IN NORTH DAKOTA ...2.0020

STANFORD WATERSHED MODEL ...6.0285

THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I ...6.0328

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES ...6.0338

#### WATER LOSS

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL ...6.0038

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS ...6.0375

#### Evaporation

WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS ...1.0011

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA ...5.0018

THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH ...5.0043

AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMEE RIVER BASIN - FLORIDA ...6.0066

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074

HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM ...6.0104

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

MACADOO ROAD-FILL DAM, KANSAS ...6.0203

LAKE HYDROLOGY ...6.0207

GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

HYDROLOGIC MODELS OF THE GREAT LAKES ...6.0267

INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE ...6.0371

#### Evapotranspiration

DROUGHT PROBABILITIES IN TENNESSEE ...2.0023

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074

DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL ...6.0163

STATUS OF LAND SUBSIDENCE DUE TO GROUND-  
WATER WITHDRAWAL IN MISSISSIPPI ...10.0008

CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF  
COAST AREA ...10.0032

#### *Interception*

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

#### *WATER QUANTITY STUDIES*

THE DETERMINATION OF THE FREQUENCY OF  
DROUGHT FLOWS OF VARYING DEGREES OF SEVERI-  
TY AND DURATION - NEW JERSEY ...2.0018

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER  
RESOURCES PLANNING STUDIES IN NEW YORK  
...6.0130

LAKE HYDROLOGY ...6.0207

#### *Available Water*

SEVERITY AND FREQUENCY OF DROUGHT IN MISSIS-  
SIPPI ...2.0015

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

STREAMFLOW CHARACTERISTICS, KANSAS ...6.0090

#### *Total Volume*

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

RUNOFF FROM SMALL AGRICULTURAL AREAS IN IL-  
LINOIS ...6.0265

#### *Water Quantity Variation*

STREAMFLOW VARIABILITY - ILLINOIS ...6.0263

#### *Water Yield*

WATER YIELD IMPROVEMENT AND AVALANCHE  
HAZARD PREDICTION IN ALPINE AREAS OF THE  
ROCKY MOUNTAINS ...1.0011

EFFECT OF PRESCRIBED BURNING ON WATER YIELD  
AND QUALITY FROM BRUSH INFESTED LANDS -  
TEXAS ...5.0022

THE IMPACT OF URBANIZATION ON WATER YIELD,  
FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALI-  
TY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS  
WATERSHEDS ...6.0375

RELATION OF CLIMATIC AND WATERSHED CHARAC-  
TERISTICS TO STORM RUNOFF IN THE EDWARDS  
PLATEAU - TEXAS ...6.0388

#### *WATER SHORTAGE*

STUDY OF SEAWATER DESALTING AS EMERGENCY  
WATER SUPPLY FOR NEW YORK CITY ...2.0001

POTENTIAL OF PRECIPITATION MODIFICATION IN  
MODERATE TO SEVERE DROUGHTS ...2.0012

SOCIALLY DEFINED ENVIRONMENTAL VALUES IN  
URBAN WATER RESOURCES PLANNING ...6.0191

WATER RESOURCES OF THE RED RIVER OF THE  
NORTH DRAINAGE BASIN IN MINNESOTA ...6.0303

#### *WATER STORAGE*

DROUGHT AND WET SPELLS IN NORTH DAKOTA  
...2.0020

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

THE GENERATION OF FLOOD DAMAGE TIME  
SEQUENCES ...6.0019

RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL  
...6.0038

HURRICANE CREEK WATERSHED PROJECT,  
HUMPHREYS AND DICKSON COUNTIES, TENNESSEE  
...6.0055

INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060

ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER  
MANAGEMENT ...6.0072

A METHODOLOGY STUDY TO DEVELOP EVALUATION  
CRITERIA FOR WILD AND SCENIC RIVERS - REPORT  
ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

DEVELOPMENT OF AN OPERATIONS MODEL FOR MON-  
TANA'S WATER RESOURCES, MIDDLE CREEK RESER-  
VOIR OPERATION ...6.0126

USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF  
WATER RESOURCES MANAGEMENT PLANS FOR NEW  
YORK STATE - ADDENDUM ...6.0131

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL  
DRAINAGE AREAS IN FLORIDA ...6.0233

FORT SCOTT LAKE, MARMATON RIVER, KANSAS  
...6.0315

STORAGE REQUIREMENTS TO CONTROL FLOOD  
FLOWS OF MISSOURI STREAMS ...6.0318

HYDROLOGIC STUDIES OF SMALL RURAL TEXAS  
WATERSHEDS ...6.0375

#### *WATER SUPPLY DEVELOPMENT*

RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100

AN EVALUATION OF URBAN FLOOD PLAINS ...6.0132

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311



STATUS OF LAND SUBSIDENCE DUE TO GROUND-  
WATER WITHDRAWAL IN MISSISSIPPI ...10.0008

## Water Supply Facility

*See Buildings & Land Development  
Building Classification*

## Water Table

- BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014
- RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068
- HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE  
COUNTY, FLORIDA ...6.0069
- GEOHYDROLOGIC CONDITIONS AND FLOOD POTEN-  
TIALS IN THE SINK AREAS OF SOUTH WESTERN  
SEMINOLE COUNTY, FLORIDA ...6.0230
- CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
STUDY ...6.0310
- CITY OF JACKSON WATER RESOURCES STUDY ...6.0311
- THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA ...6.0357
- HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON  
THE WATER SYSTEM OF NEDERLO CREEK, WISCON-  
SIN ...6.0408
- STUDY OF GROUND SHOCK INDUCED LIQUEFACTION  
AS A MECHANISM FOR FAILURE OF MILITARY IN-  
STALLATIONS ...10.0010
- CONTINUING QUANTITATIVE GROUND-WATER STU-  
DIES IN THE HOUSTON DISTRICT ...10.0013
- ARIZONA EARTH FISSURE INVESTIGATION ...10.0014
- LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO  
STUDY THE EXTENT, MAGNITUDE R ...10.0018
- DENVER URBAN CORRIDOR STUDIES - COLORADO  
...10.0020
- SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS  
...10.0028
- ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF  
NORTHWESTERN VERMONT ...15.0038

## Water Transportation

*See Transportation Engineering  
Transportation Systems*

## Water Types

### ANTECEDENT MOISTURE

- FORECASTING RAINFALL AND SNOWMELT FLOODS ON  
UPPER MIDWESTERN WATERSHEDS ...6.0113
- OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR

### BRINES

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

### FRESH WATER

MONTEREY BAY - CALIFORNIA ...3.0116

THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243

HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE  
COUNTY, FLORIDA ...6.0069

### GROUNDWATER

- BEACHES AND GROUND WATER OF CAPE SABLE,  
FLORIDA, DURING EXTREME DROUGHT ...2.0014
- RECONNAISSANCE STUDY OF RECOVERABLE GROUND  
WATER ...3.0100
- THE EFFECT OF GEOLOGIC STRUCTURE ON THE OC-  
CURRENCE OF FRESH GROUND WATER IN POST-  
OLIGOCENE DEPOSITS OF THE GULF COASTAL  
PLAIN ...3.0243
- RESPONSE OF WATER LEVELS TO FLOOD CONTROL  
OPERATIONS IN SOUTHEASTERN FLORIDA ...6.0068
- ESTUARINE HYDROLOGY OF TAMPA BAY ...6.0071
- URBAN HYDROLOGY OF POWAY VALLEY, CALIFOR-  
NIA ...6.0169
- STARKWEATHER WATERSHED, NORTH DAKOTA  
...6.0204
- HYDROGRAPH MODEL STUDIES OF THE HILL-  
SBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS,  
FLORIDA ...6.0234
- NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES,  
MACON COUNTY, ILLINOIS ...6.0258
- CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES  
STUDY ...6.0310
- CITY OF JACKSON WATER RESOURCES STUDY ...6.0311
- APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA - REGION EIGHT - 1971  
...6.0350
- APPRAISAL OF THE WATER AND RELATED LAND  
RESOURCES OF OKLAHOMA ...6.0351
- THE EFFECT OF GROUND-WATER CONDITIONS ON  
LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA ...6.0357
- BEECH RIVER WATERSHED PROJECT - TENNESSEE  
...6.0368
- WATER FOR TEXAS - URBAN WATER RESOURCES  
PLANNING AND MANAGEMENT - THE PROCEEDINGS  
OF THE ANNUAL CONFERENCE HELD AT SAN AN-  
TONIO (ABBREV) ...6.0379
- RELATION OF CLIMATIC AND WATERSHED CHARAC-  
TERISTICS TO STORM RUNOFF IN THE EDWARDS

A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023

ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLENDORA, CALIFORNIA ...9.0026

SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040

MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR ...9.0045

ROCK STRENGTH FROM FAILURE CASES ...9.0054

COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS ...10.0001

STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS ...10.0010

LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS ...10.0011

CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT ...10.0013

ARIZONA EARTH FISSURE INVESTIGATION ...10.0014

MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA ...10.0015

LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R ...10.0018

DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020

CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA ...10.0032

#### METEORIC WATER

RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) ...14.0015

#### STORM WATER

RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS ...6.0112

HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA ...6.0317

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

URBAN RUNOFF ...6.0339

RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) ...14.0015

#### SURFACE WATER

URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA ...6.0169

GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 ...6.0179

COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS ...6.0335

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971 ...6.0350

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351

THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV) ...6.0379

TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS ...6.0394

A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS ...9.0023

SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO ...9.0040

DENVER URBAN CORRIDOR STUDIES - COLORADO ...10.0020

#### Water Utilization

DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO ...2.0022

FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...6.0041

GENERAL PLAN REPORT, LAKE RED BLUFF AREA CALIFORNIA, 1971 ...6.0179

BIG CREEK WATERSHED, KANSAS ...6.0202

SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS ...10.0028

REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974 ...16.0040

#### Water Velocity

*See Hydraulics*

#### Water Volume Recorders

*See Techniques and Instrumentation Gaging*

#### Water Wells

SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS ...3.0125

GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA ...6.0230

CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY ...6.0310

CITY OF JACKSON WATER RESOURCES STUDY ...6.0311

THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA ...6.0357

CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT ...10.0013

CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA ...10.0032

## Water Yield

*See Water Supply  
Water Quantity Studies*

## Watershed Morphology

*See Geomorphology*

## Watersheds

CENTRAL FLORIDA SEEDING PROJECT ...2.0003

EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS ...5.0022

URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS ...6.0018

HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE ...6.0055

ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT ...6.0072

DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970 ...6.0087

STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF-CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV) ...6.0092

APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT ...6.0125

PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J. ...6.0127

FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS ...6.0145

FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS ...6.0146

ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS ...6.0151

DEVELOPMENT OF AN ALASKAN CONCEPTUAL

DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES ...6.0165

NUTWOOD WATERSHED, ILLINOIS ...6.0199

MACADOO ROAD-FILL DAM, KANSAS ...6.0203

THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT ...6.0240

THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED ...6.0242

OPSET - PROGRAM FOR COMPUTERIZED SELECTION OF WATERSHED PARAMETER VALUES FOR THE STANFORD WATERSHED MODEL ...6.0285

FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS ...6.0301

EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY ...6.0322

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971 ...6.0350

APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA ...6.0351

A COMPILATION OF FLOOD ABATEMENT PROJECTS IN OREGON ...6.0353

EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA ...6.0361

FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO ...6.0362

BEECH RIVER WATERSHED PROJECT - TENNESSEE ...6.0368

SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS ...6.0381

URBAN HYDROLOGY STUDY, DALLAS, TEXAS ...6.0382

VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS ...6.0387

DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS ...15.0018

## AGRICULTURAL WATERSHEDS

CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074

HYDROLOGY OF SMALL WATERSHEDS ...6.0190

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0195

UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA ...6.0196

HOLLOW CREEK WATERSHED PROJECT, SOUTH CAROLINA ...6.0197

KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES ...6.0198

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY ...6.0200

CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY,

## WATERSHEDS

- BIG CREEK WATERSHED, KANSAS ...6.0202
- STARKWEATHER WATERSHED, NORTH DAKOTA ...6.0204
- VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA ...6.0205
- RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265
- HYDRAULICS OF SHALLOW FLOWS OVER STABLE ERODED SAND SURFACES DEFINED BY AREA SPECTRA ...6.0269
- RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS ...6.0388

## FOREST WATERSHEDS

- CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS ...5.0020
- CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA ...6.0074
- DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA ...9.0036
- EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON ...9.0051
- FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST ...15.0002

## SMALL WATERSHEDS

- FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA ...6.0034
- FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA ...6.0043
- SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-DURATION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA ...6.0044
- FLOOD FREQUENCY IN URBAN AREAS, COLORADO ...6.0048
- PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0049
- FLOOD FLOWS FROM SMALL DRAINAGE AREAS ...6.0058
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO ...6.0059
- INFLOW HYDROGRAPH STUDY - WYOMING ...6.0060
- PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0061
- FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO ...6.0063
- FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI ...6.0065
- FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN

- FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII ...6.0077
- INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS ...6.0078
- FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO ...6.0079
- FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS ...6.0082
- FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS ...6.0091
- FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA ...6.0094
- FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND ...6.0102
- FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS ...6.0106
- SPECIAL FLOOD REPORTS - MISSISSIPPI ...6.0115
- SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI ...6.0122
- INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO ...6.0129
- EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA ...6.0134
- EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA ...6.0135
- EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA ...6.0136
- MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA ...6.0138
- INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA ...6.0140
- OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS ...6.0144
- HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS ...6.0149
- RUNOFF SIMULATION ...6.0156
- THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA ...6.0166
- FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA ...6.0176
- PROCEDURES FOR ESTIMATING FLOOD FLOWS FROM SMALL RURAL WATERSHEDS ...6.0177
- FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA ...6.0180
- PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO ...6.0186
- FLOOD FREQUENCY IN URBAN AREAS - COLORADO ...6.0187
- HYDROLOGY OF SMALL WATERSHEDS ...6.0190
- SMALL STREAM FLOOD CHARACTERISTICS ...6.0193
- HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA ...6.0208
- PEAK FLOW FROM SMALL DRAINAGE AREAS - CON

SMALL DRAINAGE AREAS IN SOUTH CAROLINA ...6.0222

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA ...6.0233

MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO ...6.0254

RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS ...6.0265

THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA ...6.0270

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS ...6.0281

EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA ...6.0282

SMALL STREAMS FLOOD FREQUENCY IN MAINE ...6.0287

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT ...6.0296

FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND ...6.0297

DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI ...6.0316

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI ...6.0319

HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY ...6.0323

DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY ...6.0326

FLOOD FREQUENCY STUDY IN NEW MEXICO ...6.0327

EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA ...6.0342

EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA ...6.0343

MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA ...6.0344

STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY ...6.0348

FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS ...6.0349

COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA ...6.0356

FLOOD FREQUENCY OF SMALL AREAS - SOUTH CAROLINA ...6.0365

INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA ...6.0366

FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE ...6.0370

FLOOD INVESTIGATIONS IN WYOMING ...6.0414

STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING ...6.0415

EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS ...15.0034

## Wave Action

*See Hydraulics*

## Wave Attenuation

*See Geophysics  
Seismology*

## Wave Dispersion

*See Geophysics  
Seismology*

## Wave Propagation Media

*See Geophysics  
Seismology*

## Waves

*See Also Oceanography  
Sea Water Motion*

DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION ...6.0116

FLOOD WAVES FROM A CONTROLLED BREACHED DAM ...6.0124

NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA ...6.0396

WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION ...8.0041

MARINE ENVIRONMENTAL PREDICTION ...8.0113

SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN ...15.0024

ORIENT POINT AND PORT JEFFERSON HARBOR  
...15.0028

EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC  
FACTORS INFLUENCING EROSION OF THE OREGON  
COAST ...15.0033

## **Weather**

*See Transportation Engineering  
Basic Studies*

## **Weather Charts, Maps**

*See Meteorology*

## **Weather Communication**

*See Electronic Systems  
Communication Systems*

## **Weather Data**

*See Meteorology*

## **Weather Influences**

*See Air Pollution  
Meteorological Aspects*

## **Weather Modification**

*See Meteorology*

## **Weather Sensing Instruments**

*See Meteorology  
Techniques and Instrumentation*

## **Weathering Processes**

*See Geomorphology*

## **Weirs**

*See Hydraulics*

## **Wetlands**

STARKWEATHER WATERSHED, NORTH DAKOTA  
...6.0204

INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION  
TO THEMATIC MAPPING, MISSISSIPPI RIVER ...6.0209

USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK  
ON TEN TASKS ...6.0298

## **Wild Rivers**

A METHODOLOGY STUDY TO DEVELOP EVALUATION  
CRITERIA FOR WILD AND SCENIC RIVERS - REPORT  
ON FLOOD CONTROL SUBPROJECT - IDAHO ...6.0080

## **Wilderness Areas**

PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPER-  
TIES OF FUELS RELATED TO FIRE PHENOMENA  
...5.0018

CONTROL AND USE OF FIRE PARTICULARLY IN WIL-  
DERNESS, PARK, AND OTHER RECREATIONAL AREAS  
...5.0020

## **Wind**

*See Engineering Mechanics  
Forces and Loadings  
See Meteorology*

## **Wind - Water Interaction**

*See Oceanography  
Air - Sea Boundary Studies*

## **Wind Direction**

*See Meteorology  
Wind*

## **Wind Meters**

*See Meteorology  
Techniques and Instrumentation*

## **Wind Profiles**

*See Meteorology*

## **Wind Shear**

*See Meteorology*  
*Wind*

## **Wood Structures**

*See Mechanics of Structures*

## **Wind Velocity**

*See Meteorology*

## **Zoning**

*See Buildings & Land Development*  
*Land Use and Development*

## PUBLIC ASSISTANCE

### SLAB AVALANCHE STUDIES, 1971-1972

W. J. KELLEY, State Dept. of Highways, Olympia, 198501

Interim report of the second year of a three year study of slab avalanche hazards along Washington mountain highways presented. Applicable snow, avalanche and weather data for 1971-72 are given. Also included are a treatment of the stress analysis of slab avalanches, a survey of snow clearing technology, and a survey of snow clearing technology in Japan.

1977p., NTIS No. PB-221 080/5: PC \$4.85 MF

SUPPORTED BY Washington State Government - Olympia

### THE NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS

W. J. KELLEY, Univ. of Washington, School of Arts, Seattle, 98105

Avalanche Atlas catalogs details of snow avalanche activity along the North Cascades Highway, SR-20 on the west side of the Cascade Mountains and on the east side. Data was collected during winter reconnaissance in 1970 and 1971. The atlas is designed primarily as an operational guide for highway maintenance personnel who will be involved in snow removal operations on SR-20.

1977p., NTIS No. PB-220 336/2: PC \$3.00 MF

SUPPORTED BY Washington State Government - Olympia

## DISASTER MITIGATION

### AN EVALUATION OF THE GEOLOGY PLAN FOR CALIFORNIA - EFFECTS, MAGNITUDE, & COSTS OF GEOLOGIC DISASTERS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREVIATED)

State Div. of Mines & Geology, Sacramento, 95814

The report recommends loss-reduction measures for problems which collectively threaten an estimated \$1 billion loss in California's urban areas from 1970 to 1980. The problems are earthquake shaking, loss of resources to urbanization, landsliding, flooding, erosion, expansive soils, fault displacement, volcanic hazards, and subsidence. The report evaluates the nature, distribution, and magnitude of each problem as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

1977p., NTIS No. PB-222 447/5: PC \$7.75 MF

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 1.0004, ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN

C.C. BRADLEY, Montana State University, School of Letters, Bozeman, Montana 59715 (DA-ARO(D)-31-124-73-G175)

Acoustic emissions have been detected from snow preceding avalanche release. Attempts will be made to determine whether they can be detected in time to serve as a warning of impending avalanches. Relevance - avalanches are a hazard to military operations, because previously inaccessible mountain areas, where avalanches occur frequently, are constantly being penetrated by new highways. Since the Army must be prepared to conduct operations in such regions both in the United States and on foreign soil, the need for a reliable means of predicting avalanches not only continues to exist, but is increasing.

A concerted attack will be made upon three related problems involved in slab avalanche release - (1) Laboratory and field investigation of the relevance of acoustic emission techniques to in-situ monitoring of snow slab, (2) Laboratory measurement of viscoelastic and failure properties of unconfined and confined snow, and (3) Laboratory and field study of the formation and strength of seasonal depth hoar.

Supporting agency address information: OCRD Army Research Office, Box CM, Duke Station, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

### 1.0005, ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION

C.C. BRADLEY, Montana State University, Graduate School, Bozeman, Montana 59715

This research is designed to provide a better understanding of snowpack release, especially as related to 'hard' avalanches, the most dangerous of all avalanches, which are characteristic of wind packed or metamorphosed snow slopes of high density and strongly bonded ice crystals. The research places great emphasis on laboratory and field assessment of acoustic emission techniques as a basis for making indirect observations of changing physical properties and events leading to snow avalanching. Acoustic emission instrumentation will provide in-situ monitoring of snow slabs. The research is coupled with laboratory evaluation of viscoelastic and failure properties of unconfined and confined mid-alpine snow under various conditions of loading as well as study of the formation and strength of seasonal depth hoar. The research is expected to give significant data on avalanche mechanics and hopefully will permit the prediction of potential avalanching. The work is being carried out with cooperative support from the Army Research Office - Durham.

SUPPORTED BY U.S. Natl. Science Foundation

### 1.0006, AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT



hazards, it is necessary to inventory the hazards and develop a control plan. Application of avalanche defense structures, procedures for clearance and control of operations are critical portions of the maintenance program. Several alternate operational levels with cost/benefit analysis are contained in the findings.

Pub. Sep. 71: 74p., NTIS No. PB-220 337/0 PC \$3.00 MF \$0.95.

SUPPORTED BY Washington State Government - Olympia

## HAZARD REDUCTION

### I.0007, PUGET PEAK AVALANCHE, ALASKA

M.C. HOYER, Arizona State University, School of Liberal Arts, Tempe, Arizona 85281

**Abstract** The Alaska earthquake of March 27, 1964, caused four phenomena at the head of Puget Bay in south-central Alaska. A large rock-snow avalanche fell from Puget Peak and slid into the bay. Sea waves struck the coast, transporting debris inland to elevations of 7 m. Tectonic warping uplifted Puget Bay 1.7 m, and earth cracks formed in the surficial valley alluvium. The Puget Peak avalanche transported  $1.8 \times 1,000,000$  cu m of rock, snow, soil, and plant debris downslope. The avalanche began as a large rockfall of jointed and fractured bedrock from Puget Peak. The rockfall reached the cirque traveling at a speed of more than 100 kph, there, it set in motion a large volume of snow. Most of the debris was deposited on the beach and in the bay. Undisturbed 1963-1964 snow in the cirque, areas of undisturbed vegetation and soil, made fresh grooves and scars on bedrock surfaces, and large areas stripped of surficial vegetation and soil along the avalanche track indicate that the avalanche mass slid on snow, soil, and rock from the cirque to the bay. Evidence along the avalanche track indicates that the avalanche mass traveled at high speed along its entire extent.

Pub. Dec. 70: 32p., NTIS No. AD-733 142: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Army

### I.0008, DEVELOPMENT OF METHODOLOGY FOR EVALUATION AND PREDICTION OF AVALANCHE HAZARD IN THE SAN JUAN MOUNTAINS OF COLORADO

J.D. IVES, Univ. of Colorado, Inst. of Arctic & Alpine Res., Boulder, Colorado 80302

The development of a methodology for evaluation and prediction of avalanche hazard with particular emphasis on the San Juan Mountains of Colorado, but with general applicability to other areas.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

### I.0009, THERMAL SURVEILLANCE OF ACTIVE VOLCANOES

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

**Abstract** The author has identified the following significant results. By the end of 1973, aerial infrared scanner traverses for thermal anomaly recordings of all Cascade Range volcanoes were essentially completed. Amplitude level slices of

and warm ground, it is largely deglaciated. Causing the development of sizable glacier perforation features. The outgoing radiative flux from the east breach anomalies is sufficient to account for the volume of ice melted to form the glacier perforations. DCP station 6251 has been monitoring a thermally anomalous area on the north slope of Mount Baker. The present thermal activity of Mount Baker accords for continuing hydrothermal alteration in the crater south of the main summit and recurrent debris avalanches from Sherman Peak on its south rim. The infrared anomalies mapped as part of the experiment SR 251 are considered the base evidence of the subglacial heating which was the probable triggering mechanism of an avalanche down Boulder Glacier on August 20-21, 1973.

Pub. Jan 74: 6p., NTIS No. E74-10418: PC \$4.00 MF \$1.45

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

### I.0010, SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA

R.D. MILLER, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The Juneau project started as part of a coastal communities program of earthquake hazard studies following the March 1964 Alaska earthquake. The original primary objective was to investigate and evaluate potential hazards for earthquakes as a result of the geologic setting. The study has been broadened to include other natural geologic events and to try and relate man's use of the land to the existing geologic environmental conditions. Field mapping was completed in 1971.

The project consists of differentiating and mapping surficial deposits and performing physical properties tests on selected samples. Development of raised marine and glaciomarine deposits, glaciofluvial, glacial, and lacustrine deposits is completed to the geologic history, which in part influences the different physical properties inherent in the materials. The availability and utilization of this information can help the planning and execution of urban expansion and industrial development to hopefully avoid geologic pitfalls by taking into account the geologic influence on the environment, such as relative stability of deposits in case of severe earthquakes, areas of known or potential rockfalls and avalanches, and differing foundation conditions.

A geologic map with text and interpretive transparent overlays was released to open file in May 1972. A U.S. Geological Survey Bulletin, 1394-C, was published in 1973 that gave the glaciomarine deposits a formation name, the Gastineau Channel Formation. A geologic map with tabular text is being processed for publication in the Miscellaneous Geologic Investigations Map series of the Geological Survey.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### I.0011, WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS

M. MARTINELLI, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta., Fort Collins, Colorado 80521 (RM1601)

**Objective:** Water yield improvement of alpine zones and improved avalanche hazard forecasting.

snowmelt. Techniques for stabilizing snow on steep slopes and for evaluating avalanche hazard do not exist. Determine relationships between meteorological terrain, and snowpack conditions and avalanche formation and movement.

**Progress:** There is little data on the amount of moisture lost to the atmosphere during blowing snow events. A mathematical model of sublimation losses from snow blowing over a horizontal surface showed the most important factors to be particle size and distribution, humidity, and temperature. At -20 degrees C., 90 percent relative humidity, and steady state conditions, sublimation was estimated to be 17 percent per minute. Fundamental questions still exist about humidity gradients, ventilation rate, particle composition, and particle fall velocity. It appears that appreciable water returns to the atmosphere during blowing snow events. Detonating cord was used to simulate the overpressure patterns caused by sonic booms to see if supersonic flights over snow covered mountains would cause avalanches. Simulated booms of 12 lbs./ft. overpressure released avalanches 3 out of 4 times when the snow was unstable. One of the avalanches had a fracture face of 107 inches. Although level flight produces overpressure of about 4 lbs./ft., maneuvers or terrain amplification could increase this by a factor of 3 or 4. The large storms of January 1971 and 1972 in the Cascade Mountains caused over 800 avalanches, four deaths, numerous injuries, and about three-fourths million dollars damage. The deaths and much of the property damage could have been avoided by proper zoning.

**SUPPORTED BY** U.S. Dept. of Agriculture - F.S.

#### **1.0012, PHYSICAL PROPERTIES OF ALPINE SNOW AS RELATED TO WEATHER AND AVALANCHE CONDITIONS**

**M. MARTINELLI**, U.S. Dept. of Agriculture, Rocky Mtn. For. & Rg. Ex. Sta., Fort Collins, Colorado 87101

**Abstract:** Data were taken in avalanche starting zones at an elevation of 11,700 feet in the Front Range of Colorado within 14 days of deposition. Densities varied from 40 to 450 kg/cubic meter. Snow with unusually high density for its age (initial hard slab), found in 15 percent of the pits, was correlated with moderate to high windspeeds, low temperatures, and presence of wind-transported snow. Tensile strength from a spin test varied from 1-0 to 1712 grams force/square cm. Strength increased with density but varied greatly for given densities. Younger snows tended to be weaker than older snows of the same density. Strength was also measured with shear box and shear vane. Ram resistance was higher for alpine snow than for snow of same density in trees. Air permeability was an order of magnitude less than expected and varied with the low flow rate used. Strength of snow of given density was greater for a certain permeability (texture) than for any other.

**Pub.** Jan. 71: 42p., NTIS No. PB-197 487: MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Agriculture

#### **1.0013, SNOW PACK STABILITY INDICES RELATIVE TO THE CLIMAX AVALANCHE**

**C.C. BRADLEY**, Montana State University, School of Letters, Bozeman, Montana 59715

**Abstract:** The purpose of the research is to develop instruments, methods, theories, and indices which would permit

under stress emits acoustical signals and that these signals relate to the nature of the snow and the deforming force. Of particular interest is the fact that snow retains 'memory' of the kind and degree of stress it has undergone many hours after relaxation. Also of interest is that under certain kinds of stress the pattern of acoustical emission allows anticipation of the failure of the snow as much as 40 minutes in advance. Both of these findings have implications in terms of field analysis and safety. Two theories are presented: (a) a non-linear theory for snow deformation, (b) a theory of buckling as a potentially important mechanism for slab avalanche release.

**Pub.** Jul. 73: 23p., NTIS No. AD-765 500/4: PC \$2.75 MF \$1.45.

**SUPPORTED BY** U.S. Dept. of Defense - Army

#### **1.0014, AVALANCHE CONTROL IMPLEMENTATION STUDY**

**E. LACHAPPELLE**, State Dept. of Highways, Olympia, Washington 98501 (2R-40233508)

The objective of this project is to provide immediate and complete avalanche hazard identification and control on all Cascade Mountain passes. A training program for avalanche hazard forecasts and snow avalanche observers is established. This project is the implementation phase of the research project 'Methods of Avalanche Control on Washington Mountain Highways'. The pilot implementation program is being run on Stevens Pass, Snoqualmie Pass and the North Cascades Highway.

Document provided to S.S.I.E. by the H.R.J.S.

**SUPPORTED BY** U.S. Dept. of Transportation - F.H.A.

## **2. DROUGHTS**

### **PUBLIC ASSISTANCE**

#### **2.0001, STUDY OF SEAWATER DESALTING AS EMERGENCY WATER SUPPLY FOR NEW YORK CITY**

**S.L. SCHEFFER**, Parsons Jurden Corporation, New York, New York

**Abstract:** The report concerns an investigation of the preliminary feasibility and cost of supplying 20 percent of the nominal water demand of a typical borough of the City of New York during periods of prolonged drought of the kind experienced in the mid-sixties. Multi-stage flash (MSF) desalting modules of 5, 10 and 25 MGD capacities were assumed for application in modular array to provide emergency borough needs for pure water up to 125 MGD in capacity for a single plant site. The specific plant studied was assumed to be located on an artificial island constructed one mile off Rockaway Beach. Extensive cost data are provided.

**Pub.** Ja. 70: 310p., NTIS No. PB-201 036: PC-GPO MF \$0.95-NTIS.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

J.T. ALFORD, State Div. of Mines & Geology, Sacramento, California 95814

**Abstract:** This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5; PC \$7.75 MF 1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 2.0003, CENTRAL FLORIDA SEEDING PROJECT

J.D. MCFADDEN, U.S. Dept. of Commerce, Research Flight Facility, Miami, Florida 33148

**Abstract:** A plan is presented which attempts to mitigate the drought through the seeding of clouds over Lake Okeechobee drainage basin during April and May 1971.

Pub. Mar. 71: 13p., NTIS No. COM-71-00558; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - NOAA.

#### 2.0004, STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER

S.A. CHANGNON, Univ. of Illinois, State Water Survey Division, Urbana, Illinois 61802

Project METROMEX is a 5-year coordinated group effort now going into its third year which is studying the urban weather modification in the St. Louis area. The goal is to isolate and develop quantitative relationships for the processes whereby urban and industrial areas affect their regional climate. It is anticipated that many results of this project will be in a form that makes them transferable to other regions, although some future tests of this transferability will no doubt be necessary. More specifically, the results should point the way toward the development of future environmental consequences of alternative urban and other land use patterns. The results of METROMEX, when extended to larger areas, will have application to drought alleviation, siting of large wind power and solar energy devices, planned purposeful climatic modification, and possibly to severe storm alleviation.

This particular research will use radar and ground network data to delineate the urban-produced alterations in precipitation frequency and quantity and in severe local storms.

SUPPORTED BY U.S. Natl. Science Foundation

#### 2.0005, JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT

J. SIMPSON, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Rockville, Maryland 20852

**Abstract:** A serious drought in the spring of 1971 occurred in South Florida. Two of the NOAA Research Flight Facility

and also the uplean towers of each previously seeded complex.

Pub. 1972: 13p., NUS No. COM-73-10656 Reprint  
SUPPORTED BY U.S. Dept. of Commerce - NOAA

#### 2.0006, OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM (ODROP)

J.L. SUTHERLAND, Weather Sciences Incorporated, Norman, Oklahoma 73069

**Abstract:** Cloud seeding was conducted in drought-stricken areas of Oklahoma during the two month period beginning 15 August 1971 to augment precipitation. Over 175 clouds were seeded with about 47,000 grams of silver iodide released pyrotechnically by aircraft at cloud base. Not more than three aircraft were used for the silver iodide seeding. The analysis of digitized radar data has indicated that the seeding-related rainfall amount on 11 of the 19 seeding days was about 50,000 acre feet or 16 billion gallons.

Pub. Dec. 71: 47p., NTIS No. PB 207 041; PC \$4.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

#### 2.0007, HYDROLOGIC SYSTEMS MODELING AND SIMULATION

G. ARON, Penn. State University, Inst. Res. Land & Wtr. Resour., University Park, Pennsylvania 16802

The objective of this project is to simulate selected hydrologic processes which are known to cause damages to land, vegetation and structures, for the purpose of developing practical solutions and measures to alleviate these damages. In the forefront of the hydrologic processes are floods and droughts. Mathematical models are being developed to simulate storm runoff, and applied to urban areas which have experienced flood problems in the past. In collaboration with students and municipal engineers as well as planners, devices or methods are being devised to reduce or delay the storm runoff and/or increase flow carried by existing storm sewers. A developed drought prediction model will be applied to various drought flow data for further confirmation and calibration.

SUPPORTED BY Pennsylvania State University

### HAZARD REDUCTION

#### 2.0008, PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV)

T.J. HENDERSON, Atmospherics Incorporated, Fresno, California

**Abstract:** Project Arid Drop was organized and directed by the Bureau of Reclamation to alleviate arid conditions over broad areas of Texas, Arizona and Oklahoma. The portion of the project outlined in this report is a summary of Atmospherics Incorporated in aerial application of silver iodide to convective cumulus developments. Accomplished during the period July 16 through August 12, 1971, these cloud seeding efforts were coordinated with the flight and radar activities of Meteorology Research based at Flagstaff, plus the

the ground from about mid- to the treated cells, while the remaining cells produced only virga or no precipitation. Further observations indicated proper treatment of cumulus clouds initiated precipitation, and enhanced the total rainfall from clouds where precipitation was already in progress.

Pub. Oct. 71: 19p., NTIS No. PB-204 604; PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

## 2.0009, HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I

P.B. MACCREADY, Flight Test Research Inc., Long Beach, California

Abstract: In July 1971, because of apparent drought in southwest Oklahoma, a rainfall augmentation program was organized under the direction of the Division of Atmospheric Water Resources Management of the Bureau of Reclamation with funding provided by the Federal Office of Emergency Preparedness. The hygroscopic seeding project part of the overall program is discussed. Seeding flights were accomplished on 10 days during the period from mid-August to early October, with a record wet September for Oklahoma. There is no way to make a valid evaluation of the success of this operational program. The program is described and many of the concepts and factors behind hygroscopic seeding are examined.

Pub. Oct. 71: 45p., NTIS No. PB-205 361; PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

## 2.0010, FLORIDA CUMULUS SEEDING EXPERIMENT FOR DROUGHT MITIGATION, APRIL-MAY 1971

W.L. WOODLEY, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302

Abstract: As a result of the drought in south Florida in the spring of 1971, The Experimental Meteorology Laboratory (EML) undertook a dynamic cumulus seeding program in two target areas, one to the north and the other to the south of Lake Okeechobee. In the 61-day operational period from 1 April - 31 May, flights were conducted on 16 days, with actual seeding on 14 days. Real time runs of the EML one-dimensional cumulus model on the 1200 GMT Miami radiosonde eliminated 38 days as unseedable; seven additional seed days might have been obtained had a back-up seeder aircraft been available. Altogether, 2066 50-gm AgI flares were dropped into 196 clouds or cloud complexes. Altogether, seeded clouds produced about 180,000 acre-feet of rain. Conservative estimates ascribe about 100,000 acre-feet to seeding, leading to a benefit-to-cost ratio for the program exceeding thirty-to-one.

Pub. Nov. 71: 166 p., NTIS No. COM-72-10149; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## 2.0011, DROUGHT CLIMATOLOGY OF ILLINOIS

F.A. HUFF, State Water Survey, Chicago, Illinois 60601

Abstract: Analyses of the frequency distribution of droughts for periods of 3 to 60 months indicate that the relative severity is greatest in the southeastern, extreme southern and southwestern regions of the state. Severe droughts having durations exceeding 24 months are infrequent in Illinois. In general, the regions of greatest drought severity are elongated

in the 1900-53 study period occurred in the 1930's. A major drought-free period extended from 1943 through 1951. For droughts of 3, 6, 12, and 24 months, there is a 50 percent probability that another drought of the same duration will occur somewhere in Illinois within about 30 months after a similar drought has terminated.

Pub. 1963: 74p., NTIS No. PB-220 413/9; PC \$5.75 MF \$0.95.  
SUPPORTED BY Illinois State Government - Springfield

## 2.0012, POTENTIAL OF PRECIPITATION MODIFICATION IN MODERATE TO SEVERE DROUGHTS

F.A. HUFF, State Water Survey, Urbana, Illinois 61801

Abstract: An investigation was made of the potential of precipitation modification in moderate to severe droughts in Illinois to alleviate water shortages in such critical periods. The study involved time and space analyses of the natural precipitation distribution and consisted of two phases. The first involved analyses of monthly precipitation characteristics in major 12-month and 24-month droughts in the 50-year period, 1906-55. The second phase was concerned with a detailed study of storm characteristics in the 1953-54 drought, one of the worst on record in Illinois. Results indicated that conditions occasionally prevail in some moderate to severe droughts during which successful cloud seeding might provide temporary relief over portions of an extensive drought region, especially with respect to providing agricultural relief. Potential for increasing municipal water supplies in the more severe drought conditions appear doubtful.

Pub. May 73: 32p., NTIS No. PB-228 817/3; PC \$4.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

## 2.0013, DROUGHT IN KANSAS

M.J. BROWN, Kansas State University, Agricultural Experiment Sta., Manhattan, Kansas 66502

Abstract: The duration and intensity of meteorological droughts, as determined by the Palmer Drought Index (PDI), are reported for the nine crop districts of Kansas for 1931 through 1968. Results of the analysis can be used to determine dry and wet period expectancies, land use capabilities, and drought disaster areas. Summaries of overall moisture conditions are presented for each district for each month in the time period covered. Month to month variables and months of drought are indexed and tabulated. The beginning and ending dates, the maximum severity, and the number of months of drought are listed for each period. The percentage frequency of the various classes of drought (established by the PDI) are indicated for each climatological division. These climatological divisions correspond directly to the nine crop districts.

Pub. Mar. 71: 14p., NTIS No. COM-72-11021; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## 2.0014, BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT

R.J. RUSSELL, Louisiana State Univ. Systems, Coastal Studies Institute, Baton Rouge, Louisiana 70803

Abstract: In October 1969 beaches and water tables were investigated after 5 months of adequate rainfall in the Cape

(1969) or various local storms. Slabs of the eroded beach rock were tossed up on the beaches, and if sufficiently indurated became incorporated into the deposits. No evidence of subsequent cementation was observed. On East and Northwest capes the ground water had been replaced by stagnant seawater. On Middle Cape the water table was lowered, but a salinity gradient and some potable ground water were present in 1971. The Cape Sable region is isolated from mainland surface runoff by extensive areas of lakes and waterways with seawater salinities, and from subsurface flow of ground water by a thick section of compact marl and compressed peat. Accumulation of ground water depends on local rainfall, and its volume varies with size and permeability of catchment areas. The conclusions of this study are applicable to many other coastal areas and may be useful in assessing their population and survival potentialities.

Pub. Aug. 71: 27p., NTIS No. AD-731 381. PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

## 2.0015, SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI

J.C. MCWHORTER, Mississippi St. University, School of Agriculture, State College, Mississippi 39762

This project will develop a monthly water balance for six geographic and soil areas in Mississippi for the period 1943-1972. Moisture excesses and deficiencies will be determined; and then, the beginning and ending of drought periods will be observed. These periods will be classified according to degree of severity in order to secure the frequency of occurrence of a given drought.

Weather stations which are representative of each study area will be selected. Monthly temperature and precipitation values for each area will be determined from climatological records and values will be calculated for each area which represent the available water capacity in the root zone. Computer programs will be developed which use the above data to seek the severity and frequency of drought in Mississippi.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

## 2.0016, NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE

M.P. LAWSON, Univ. of Nebraska, School of Arts, Lincoln, Nebraska 68508

Abstract: The purpose of the report is to measure the spatial and temporal dimensions of drought occurrence in Nebraska. Such interpretations were facilitated by the computer generation of 468 maps showing monthly values of drought in Nebraska, from 1931 through 1969. While it was found that the frequency of consecutive drought is least in the central portion of the state, the intensity of drought is greatest in this region. Maps of correspondence which relate the areal correlation between rural population density and precipitation also indicate high positive relationships for central Nebraska. Interpretation of tree ring growth values using moving t-test plots did not demonstrate the cyclical recurrence of drought. A short review was conducted as to the economic and climatic impact of irrigation on future droughts in Nebraska.

Pub. Jul. 71: 150p., NTIS No. PB-214 093/7. PC \$3.00 MF \$0.95.

Objective: Provide a comprehensive analysis of resource use in the Central Lahontan Basin under present and projected conditions by relating economic data and interpretations with physical data so that planning and development of resources may proceed on a more sound basis. Specific goals are: identification and description of present economic activity in the basin and its relation to land and water resources; evaluate the economic impact of factors such as improved agricultural technology, expansion of markets, and shifting resources from agriculture to other uses; evaluate the economic consequence of drought and flooding; identify and evaluate changes in land and water use patterns needed for more efficient use of resources and identify developments to meet projected needs; and identify and appraise major problems in the attainment of desirable patterns of use, management, and development of land and water resources.

Approach: Identify present level of resource use, resource development, and economic activity. Make population projections and project needs for output from resource use. Identify means of meeting future needs through resource use and development. Evaluate the economic consequence of alternative resource use and development decisions. Analytical techniques used include linear programming, budgeting, amortization, and standard statistical analysis of data.

Progress: Subbasin analysis was discontinued. Basin-wide analysis is now underway. Work plan and analytical models have been formulated. Additional data collection is underway.

SUPPORTED BY Nevada State Government - Carson City

## 2.0018, THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY

E.G. MILLER, U.S. Dept. of the Interior, Geological Survey, Trenton, New Jersey 08607

Information on the frequency of drought flows of varying degrees of severity and duration is needed for the proper analysis of water supply problems, administration of the New Jersey diversion law, studies of dilution of wastes, studies of effect of droughts on estuarine water quality, and studies of adequacy of quantity of water for cooling purposes and generation of power.

To evaluate and publish the frequency of drought flows of varying degrees of severity and duration at all gaging stations not seriously affected by regulation or diversion. To suggest how these low-flow frequencies might be used to estimate low flow figures at ungaged sites.

Gaging station data through the 1967 water year have been processed by a digital computer to obtain statistics of low flow. The severity of drought periods have been evaluated both in time and geographically. Data collected at partial record stations have also been utilized in the analysis.

Determined 7-day low-flow discharges for 2-year recurrence intervals for about 15 low-flow partial-record stations for which relationships with nearby continuous-record gaging stations have recently been defined. Plotted these values on work map.

Prepare low-flow frequency data for publication.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

## 2.0019, EROSION AND DEPOSITION IN THE SANDS AND ESTUARIES OF THE NORTH CAROLINA COAST

Pub. 1963: 74p., NTIS No. PB-220 413/9. PC \$5.75 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

## HYGROSCOPIC SEEDING IN OKLAHOMA - SUMMARY

McCREADY, Flight Test Research Inc., Long Beach,  
California

Abstract: In July 1971, because of apparent drought in  
west Oklahoma, a rainfall augmentation program was  
initiated under the direction of the Division of Atmospheric  
& Resources Management of the Bureau of Reclamation.  
Funding provided by the Federal Office of Emergency  
Assistance. The hygroscopic seeding project part of the  
program is discussed. Seeding flights were accom-  
plished on 10 days during the period from mid-August to  
October, with a record wet September for Oklahoma.  
It is no way to make a valid evaluation of the success of  
the operational program. The program is described and  
some of the concepts and factors behind hygroscopic seeding  
are examined.

Pub. 71: 45p., NTIS No. PB-205 361. PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

## FLORIDA CUMULUS SEEDING EXPERIMENT DROUGHT MITIGATION, APRIL-MAY 1971

WODDLEY, U.S. Dept. of Commerce, Environ. Research  
Laboratory, Boulder, Colorado 80302

Abstract: As a result of the drought in south Florida in the  
fall of 1971, The Experimental Meteorology Laboratory  
(EML) undertook a dynamic cumulus seeding program in  
target areas, one to the north and the other to the south  
of Lake Okeechobee. In the 61-day operational period from  
April 1 - 31 May, flights were conducted on 16 days, with  
seeding on 14 days. Real time runs of the EML one-  
dimensional cumulus model on the 1200 GMT Miami  
soundings eliminated 38 days as unseedable; seven addi-  
tional seed days might have been obtained had a back-up  
aircraft been available. Altogether, 2066 50-gm AgI  
aerosols were dropped into 196 clouds or cloud complexes. Al-  
together, seeded clouds produced about 180,000 acre-feet of  
rain. Conservative estimates ascribe about 100,000 acre-feet  
of rain, leading to a benefit-to-cost ratio for the program  
of about thirty-to-one.

Pub. 71: 166 p., NTIS No. COM-72-10149. PC \$3.00 MF

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## DROUGHT CLIMATOLOGY OF ILLINOIS

HUFF, State Water Survey, Chicago, Illinois 60601

Abstract: Analyses of the frequency distribution of droughts for  
periods of 3 to 60 months indicate that the relative severity is  
greatest in the southeastern, extreme southern and  
western regions of the state. Severe droughts having du-  
rations exceeding 24 months are infrequent in Illinois. In  
general, the regions of greatest drought severity are con-

centrated in the extreme southern region.

Pub. 1963: 74p., NTIS No. PB-220 413/9. PC \$5.75 MF \$0.95.  
SUPPORTED BY Illinois State Government - Springfield

## 2.0012, POTENTIAL OF PRECIPITATION MODIFICA- TION IN MODERATE TO SEVERE DROUGHTS

HUFF, State Water Survey, Urbana, Illinois 61801

Abstract: An investigation was made of the potential of  
precipitation modification in moderate to severe droughts in  
Illinois to alleviate water shortages in such critical periods.  
The study involved time and space analyses of the natural  
precipitation distribution and consisted of two phases. The  
first involved analyses of monthly precipitation characteristics  
in major 12-month and 24-month droughts in the 50-year  
period, 1906-55. The second phase was concerned with a  
detailed study of storm characteristics in the 1953-54  
drought, one of the worst on record in Illinois. Results in-  
dicated that conditions occasionally prevail in some moderate  
to severe droughts during which successful cloud seeding  
might provide temporary relief over portions of an extensive  
drought region, especially with respect to providing agricul-  
tural relief. Potential for increasing municipal water supplies  
in the more severe drought conditions appear doubtful.

Pub. May 71: 32p., NTIS No. PB-228 817/3. PC \$4.75 MF  
\$1.45.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

## 2.0013, DROUGHT IN KANSAS

M.J. BROWN, Kansas State University, Agricultural Experi-  
ment Sta., Manhattan, Kansas 66502

Abstract: The duration and intensity of meteorological  
droughts, as determined by the Palmer Drought Index (PDI),  
are reported for the nine crop districts of Kansas for 1931  
through 1968. Results of the analysis can be used to deter-  
mine dry and wet period expectancies, land use capabilities,  
and drought disaster areas. Summaries of overall moisture  
conditions are presented for each district for each month in  
the time period covered. Month to month variables and  
months of drought are indexed and tabulated. The beginning  
and ending dates, the maximum severity, and the number of  
months of drought are listed for each period. The percentage  
frequency of the various classes of drought (established by  
the PDI) are indicated for each climatological division. These  
climatological divisions correspond directly to the nine crop  
districts.

Pub. Mar. 71: 14p., NTIS No. COM-72-11021. PC \$3.00 MF  
\$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## 2.0014, BEACHES AND GROUND WATER OF CAPE SA- BLE, FLORIDA, DURING EXTREME DROUGHT

R.J. RUSSELL, Louisiana State Univ. Systems, Coastal Studies  
Institute, Baton Rouge, Louisiana 70803

Abstract: In October 1969 beaches and water tables were in-  
vestigated after 5 months of adequate rainfall in the Cape

Sable complex. In April 1971 a similar study was made after 5 months of extreme drought in the Florida Everglades, when water tables were lowered and flattened enough to permit widespread saltwater intrusion. Much of the beach rock and cemented water-table rock under the beaches had been eroded by high-energy waves, probably of Hurricane Laurie (1969) or various local storms. Slabs of the eroded beach rock were tossed up on the beaches, and if sufficiently indurated became incorporated into the deposits. No evidence of subsequent cementation was observed. On East and Northwest capes the ground water had been replaced by stagnant seawater. On Middle Cape the water table was lowered, but a salinity gradient and some potable ground water were present in 1971. The Cape Sable region is isolated from mainland surface runoff by extensive areas of lakes and waterways with seawater salinities, and from subsurface flow of ground water by a thick section of compact marl and compressed peat. Accumulation of ground water depends on local rainfall, and its volume varies with size and permeability of catchment areas. The conclusions of this study are applicable to many other coastal areas and may be useful in assessing their population and survival potentialities.

Pub. Aug 71 27p., NTIS No. AD-731 381; PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Defense - Navy

## 2.0015, SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI

J.C. MCWHORTER, Mississippi St. University, School of Agriculture, State College, Mississippi 39762

This project will develop a monthly water balance for six geographic and soil areas in Mississippi for the period 1943-1972. Moisture excesses and deficiencies will be determined; and then, the beginning and ending of drought periods will be observed. These periods will be classified according to degree of severity in order to secure the frequency of occurrence of a given drought.

Weather stations which are representative of each study area will be selected. Monthly temperature and precipitation values for each area will be determined from climatological records and values will be calculated for each area which represent the available water capacity in the root zone. Computer programs will be developed which use the above data to seek the severity and frequency of drought in Mississippi.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Reh.

## 2.0016, NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE

M.P. LAWSON, Univ. of Nebraska, School of Arts, Lincoln, Nebraska 68508

Abstract. The purpose of the report is to measure the spatial and temporal dimensions of drought occurrence in Nebraska. Such interpretations were facilitated by the computer generation of 468 maps showing monthly values of drought in Nebraska, from 1931 through 1969. While it was found that the frequency of consecutive drought is least in the central portion of the state, the intensity of drought is greatest in this region. Maps of correspondence which relate the areal correlation between rural population density and precipitation also indicate high positive relationships for central Nebraska. Interpretation of tree ring growth values using moving t-test plots did not demonstrate the cyclical recurrence of drought. A short review was conducted as to the economic and climatic

SUPPORTED BY U.S. Dept. of

## 2.0017, ECONOMIC EVALUATION OF WATER DEVELOPMENT OF WATER

H.C. LITTLE, Univ. of Nevada, Reno, Nevada 89507 (NEV0029)

Objective: Provide a comprehensive analysis of the Central Lahontan Basin under existing conditions by relating economic conditions to physical data so that planning and development may proceed on a more sound basis. Identification and description of the basin and its relation to land use, and estimate the economic impact of future technological expansion of resources from agriculture to other economic consequence of drought. Evaluate changes in land and water use, more efficient use of resources to meet projected needs, and identify problems in the attainment of water management, and development.

Approach: Identify present level of development, and economic projections and project needs for future development. Identify means of meeting future needs and development. Evaluate the economic consequences of alternative resource use and development. Techniques used include linear programming, amortization, and standard statistical methods.

Progress: Subbasin analysis was completed. Analysis is now underway. Work plan has been formulated. Additional data are being collected.

SUPPORTED BY Nevada State

## 2.0018, THE DETERMINATION OF DROUGHT FLOWS OF SEVERITY AND DURATION

E.G. MILLER, U.S. Dept. of the Interior, Trenton, New Jersey 08607

Information on the frequency and duration of degrees of severity and duration of drought analysis of water supply problems in New Jersey diversion law, studies of the effect of droughts on estuarine systems, and adequacy of quantity of water for power generation of power.

To evaluate and publish the frequency and duration of degrees of severity and duration of drought seriously affected by regulation of flow, these low-flow frequencies must be determined at ungaged sites.

Gaging station data through the use of a computer processed by a digital computer to determine flow. The severity of drought is determined both in time and geographical location. Record stations have also been determined.

Determined 7-day low-flow discharge rates for intervals for about 15 low-flow periods. Relationships with nearby conditions have recently been defined. A map of the state of New Jersey.

Prepare low-flow frequency data for the state of New Jersey.

**R.L. INGRAM**, Univ. of North Carolina, School of Arts, Chapel Hill, North Carolina 27514

The objectives of this project are: (1) to determine the changes that are taking place in the bottom topography and shorelines of selected study areas typical of the total sound-estuary environment of the North Carolina coast, but especially Pamlico Sound, (2) to study the erosional and depositional processes responsible for these changes, and (3) to predict future changes.

**How information will be applied:** Information gained in this program will be used by State and Federal agencies to predict the effects on erosion and deposition of (1) storms; (2) changes in river regime from floods, droughts, dams; (3) soil conservation practices, (4) opening and closing of inlets, (5) dredging activities; (6) construction of shoreline facilities, (7) shoreline and bottom mining.

**Accomplishments during the past twelve months:** old and new aerial photographs of the study areas have been obtained and are being studied. Detailed bathymeter tracings are being made. The heavy mineral content of 173 samples has been used to estimate the source of the sands being deposited in the sounds and estuaries. The clay mineral content of 80 samples has been used to estimate the source of the clays being deposited in the sounds and estuaries. Box cores are being taken in the study areas.

**SUPPORTED BY** U.S. Dept. of Commerce - NOAA

## 2.0020, DROUGHT AND WET SPELLS IN NORTH DAKOTA

**J.M. RAMIREZ**, North Dakota State University, Agricultural Experiment Sta., Fargo, North Dakota 58103 (ND04516)

**Objective:** Develop a model for determining the occurrence and probabilities of drought and wet spells in a subhumid climate. Apply the model to the soil survey and climatic data from several stations in the state.

**Approach:** An improved moisture accounting procedure to determine the occurrence, severity, and space distribution of drought and wet spells will be developed. An appropriate probability distribution function will be used to compute probabilities of occurrence, start and end dates, and severities of drought and wet spells using a dense climatological network in North Dakota. The basic model of W.C. Palmer for calculating the water balance will be considered and further refinements with respect to the number of soil layers with differing physical properties, depths of soil profile and winter moisture balance procedures will be made.

**Progress:** Fifty-five climatic stations from North Dakota have been selected for evaluation of drought and wet spell periods across the state. Moisture-balance accounting models, based mainly on the Palmer Drought Index, have been developed to include the following modifications: weekly accounting of water balance, available soil water storage may be in varying numbers of soil layers according to soil type and rooting characteristics of crops grown, variable water withdrawal factors are calculated to adjust the rate of water loss from each layer as affected by the water holding capacity of the layer and the amount of moisture present in it during the period in question, and accounting of winter precipitation in the cumulative moisture accounting procedure. The modified-moisture

**Abstract:** The authors review and suggest possible changes in Federal water resources policies and programs for reduction of losses from floods, drought, and hurricanes. Federal flood control policy is reviewed, leading up to the analysis of alternatives contained in the 1966 report of a task force on Federal flood control policy which is leading to changes in Federal policy. Response to the drought of the mid-1960's in Massachusetts is analyzed. Arguments are presented against single solutions, and emphasis is placed on the need for research on alternatives.

**Pub. Dec. 71:** 127p., NTIS No. PB-211 922; PC \$5.45 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

## 2.0022, DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO

**M. CAPELL**, Univ. of Puerto Rico, Agricultural Experiment Sta., Mayaguez, Puerto Rico 00928 (PR00169)

**Objective:** Characterize rainfall occurrence and recognize drought incidence in the agricultural regions of Puerto Rico by developing a suitable rainfall deficiency index.

**Approach:** The agricultural regions of Puerto Rico, defined on the basis of similar rainfall occurrence and temperature range, will be evaluated by their rainfall characteristics and agricultural drought incidence.

**Progress:** Two equations were developed to characterize rainfall distribution and rainfall deficiency, while involving different rainfall parameters to yield calculated yearly values which suggest the existence of cyclic trends over a 10- to 11-year span. On years ending in either 6 or 7, the drier part of the year becomes particularly dry while the rainfall distribution along these years is highly uneven relative to other years. Both conditions are reflected by the high values of the Rainfall Distribution Coefficient (RDC) and the correspondingly low values of the Rainfall Deficiency Index (RDI). Conversely, on years ending in either 1 or 2, the drier part of the year is least particularly dry while the rainfall distribution is generally then the most uniform. It may be observed that both circumstances occur about half-way between each other along the 10- to 11-year span. This situation is better defined for Caguas than for Fajardo. At the former location the RDC, which should approach 0.50 from above as an optimum value, shows mean values of 2.06 and 0.87 for the years of worse and better distributed rainfall, respectively. The RDI, which should approach 5.00 from below as an optimum value, shows mean values of -0.31 and 2.77 for the years of most and least deficient rainfall, respectively. In all cases the standard deviation of RDC and RDI is significantly lower when calculated for years ending in 6 or 7, or in 1 or 2, than when calculated for all the years. A manuscript on two proposed rainfall-characteristic indices was submitted for publication.

**SUPPORTED BY** U.S. Dept. of Agriculture - C.S.R.S.

## 2.0023, DROUGHT PROBABILITIES IN TENNESSEE

**W.L. PARKS**, Univ. of Tennessee, School of Agriculture, Knoxville, Tennessee 37916

**Climatological data** from selected stations that will give good regional and be representative of the State will be collected



## 2.0024, METEOROLOGICAL DROUGHT IN TENNESSEE

J.P. FAIKS-NORAS, U.S. Dept. of Commerce, Natl. Weather Service, Nashville, Tennessee

Abstract: A 39-year climatology is presented to delineate occurrences of meteorological drought (abnormally dry weather) in various sections of the State. Occurrences of meteorological drought were obtained from a method developed previously (Palmer and Havens, 1958). Results are exhibited graphically for each of the four Climatological Divisions in the State. The data show: (1) the Eastern Division probably has a real seasonal difference in the frequency of serious drought, precipitation being less reliable in winter than in summer; (2) of the four divisions, serious drought (index less than -3.0) occurred least frequently in the Cumberland Plateau and most frequently in the Middle Division; (3) drought periods which lasted a year or more were most frequent in the Western Division and least frequent in the Eastern Division.

Pub. 1972: 9p., NTIS No. COM-73-10439; Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## 3. EARTHQUAKES

## INDIVIDUAL ASSISTANCE

## 3.0001, EARTHQUAKES AND INSURANCE

UNKNOWN, Calif. Inst. of Technology, Center for Res. Prev. Disaster, Pasadena, California 91109

Abstract: The annual conference of the Earthquake Research Affiliates, was held in 1973 on the campus of the California Institute of Technology. Some of the papers presented at the conference dealt with earthquake hazards and insurance, and it was decided to publish them. Papers dealing with the 1906 San Francisco earthquake and the 1971 San Fernando earthquake which were discussed are also included.

Pub. Jul 73. 162p., NTIS NO. PB-223 033/2; PC \$10.25 MF \$1.45.

SUPPORTED BY California Inst. of Technology - Pasadena

## 3.0002, STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A

K.P. STEINBRUGGE, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

Abstract: The report discusses engineering, insurance and the influence of deductibles on the amount of loss with respect to earthquake damage to wood frame dwellings.

Pub. 1969: 148p., NTIS No. COM-71-00053; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## PUBLIC ASSISTANCE

## 3.0003, LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES

T. IWASAKI, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

capacity and stability of soils, earth pressures, hydraulic pressures, dynamic properties of bridges, field measurements of earthquake response of bridges, dynamic analyses of bridges, and laboratory experiments. Specifications for the earthquake-resistant design of bridges as used by many organizations are also included.

Pub. Nov. 72: 434p., NTIS No. PB-215 613/1; PC \$6.00 MF 0.95.

SUPPORTED BY University of California

## 3.0004, REPORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION

UNKNOWN, Los Angeles Co. Bd. of Supvs., Los Angeles, California

This briefly highlights the work of the six Earthquake Task Forces appointed by the Board of Supervisors and presents recommendations concerning the problems identified by the Los Angeles County Earthquake Commission in its report of November 1971. The recommendations are set forth on a subject by subject basis and also on an agency by agency basis. These two arrangements identify what is totally recommended on each topic and what is totally recommended to each concerned jurisdiction or agency.

The subjects are: hazardous old buildings, safety of dams, highway structures, code revisions, facilities vital in emergencies, federal construction, schools, houses, earthquake insurance, non-structural damage, utilities, instrumentation of major structures research, strong ground shaking and faulting, and emergency operations for earthquakes.

Pub. Mar. 72: 61p., no copy info available.

Abstract provided by FDAA.

SUPPORTED BY Los Angeles County Government - California

## 3.0005, BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971

P.J. HRADILEK, U.S. Army, Engineer District, Los Angeles, California 90053

Abstract: A study of the behavior of two flood control channels in the San Fernando earthquake of 9 February 1971 is presented. The report concentrates on the underground conduit reaches of these channels. A detailed account of the heavily damaged areas is presented. Correlations are made between tectonic movements and the behavior of the conduits. One conduit was crossed by a segment of the main fault break. Points on either side of the break experienced vertical, transverse and longitudinal offsets of about 4, 6 5, and 4 feet, respectively. Extensive areas of the conduits suffered failure of the walls due to lateral loads. Evidence of plastic hinge formation was encountered.

Pub. Jan. 72: 171p., NTIS No. AD-739 605; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

## 3.0006, VAN NORMAN RESERVOIRS AREA, CALIFORNIA

San Fernando earthquake (M 6 1/2). The investigation and reports are complete: the permanent ground deformations associated with the 1971 earthquake were mapped in detail and found to extend into the reservoir area and to reproduce or renew long-established features related to the active regional tectonic system; the distribution, attitude, history, and activity of faults in the reservoir area were determined and their relation to the regional fault system established; these local and regional relations, plus the tectonic setting and seismic history of the region, indicate that a magnitude 7.7 earthquake should be expected in the Van Norman area. The transitory and permanent effects of such an earthquake were derived.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**3.0007, PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973**

*S.K. TAKAHASHI, U.S. Navy, Civil Engineering Lab., Port Hueneme, California 93041*

**Abstract:** The report contains information and photographs obtained during a preliminary investigation of structural damage caused by the Point Mugu, California earthquake of 21 February 1973. The earthquake was rated at 5.9 on the Richter scale and caused widely scattered minor damage to residential buildings, damage to numerous stores with perishable and fragile goods, and resulted in unsafe conditions in many older unreinforced structures. Structural damage also occurred at the U.S. Naval Missile Center at Point Mugu. Damage to a three-story barracks, to a two-story Headquarters building, to an airfield hangar and to other facilities are described.

Pub. Aug. 73: 37p., NTIS No. AD-768 293/3: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Navy

**3.0008, COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION**

*J.H. WIGGINS, John H. Wiggins Company, Redondo Beach, California 90277*

The project will investigate the possible effects of earthquake engineering research expenditures on life and property loss from future U.S. earthquakes. Four specific times in the next thirty years will be examined and the effects of possible earthquake activity obtained. The three specific 'events' to be examined are: a recurrence of the 1811-1812 New Madrid earthquake, a recurrence of the 1906 San Francisco earthquake, and the total expected annual U.S. earthquake occurrences. Each possible event will be investigated for each possible date assuming different availability of research results. The potential damage mitigation will be accomplished by: 1) estimating the expected damages to the U.S. during each event; 2) estimating the costs of reducing those damages as a function of research dollars available and the types of research at which these dollars are directed, and; 3) estimating the damageability reduction algorithm.

This report describes an innovative study which for the first time examines the national earthquake loss problem and develops a justifiable earthquake engineering research budget aimed at loss mitigation. The approach taken was to sweep the known earthquake occurrence history (hazard) over the exposed construction for the entire 50 United States and calculate annual damages, deaths and injuries in constant 1970\$ for the years 1970, 1980, 1990 and 2000. Also examined were two scenarios, the recurrence of the San Francisco 1906 and New Madrid 1811-1812 earthquakes during the same years, 1970, 1980, 1990 and 2000. These gave a perspective on extreme, sudden loss estimates of damage as well as annual loss estimates and the effect of potential mitigation adjustments.

A number of operations and estimations were used throughout the study, each of which were independent variables affecting the outcome of the report. The framework and operational procedures developed is an important outcome. Many other hazards other than earthquake can be treated in a like manner in order to learn about budgeting for research in the other areas.

There are many tables of results that can be used by interested readers to examine specific questions in more detail.

Pub. May 74: 130p., Tech. Report No. 74-1201-1; J.H. Wiggins Co., 1650 So. Pacific Coast Highway Redondo Beach, Calif. 90274.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0010, EARTHQUAKE-INDUCED EMBANKMENT DISTRESS**

*R.A. FORSYTH, State Div. of Highways, Sacramento, California 95814 (2R63220117)*

The objectives are to survey and catalog the earthwork damage, determine the mechanisms involved in causing the damage, and to make recommendations for minimizing earthquake damage on future projects. Ground breakage will be mapped, earthwork damage will be related to geologic features, design, and construction methods.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - FHWA.

**3.0011, URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

*UNKNOWN, State Div. of Mines & Geology, Sacramento, California 95814*

The results of a three-year study of geologic problems in California are presented. The total projected loss attributable to property damage, life loss and loss of mineral resources, including both direct and indirect costs, caused by ten geologic problems in California from 1970 to 2000 is estimated to be \$55 billion. Four problems- earthquake shaking, loss of mineral resources, landsliding, and flooding-account for 98 percent of the total projected loss. The remaining 2 percent of the estimated loss is due to erosion activity, ex-

tures is estimated at \$6 billion, for an overall benefit: cost ratio of 6.2:1. In addition, then, to satisfying the needs for increased public safety and the social and political concerns therefor, geologic hazards loss-reduction is also 'good business'.

The degree of effectiveness of the various types of loss-reduction measures possible are reviewed and recommendations are presented. The most effective action that can be taken is for cities and counties to strengthen and diligently enforce existing grading ordinances and building codes.

A methodology for setting priorities for the application of loss-reduction measures is presented. The study concludes that no single ranking of priorities with respect to localities, specific problems, or particular loss-reduction programs, is feasible; but the actions taken should commence in the more populated and the more hazardous areas.

Pub. 73, 112p., No copy info available.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 3.0012, THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE

R.H. PRYSOCK, State Materials & Res. Dept., Sacramento, California

Abstract: The overall objective of the study is to develop recommendations concerning design and construction for minimizing distress of highway earthworks during future earthquakes. This report describes the effects of the San Fernando earthquake on freeway earthworks. Generally cut slope performance was good although three slides did occur in very large cuts. Two developed in the upper portions of the slopes and did not collapse completely. Embankments were susceptible to shear failure, subsidence caused by densification, spreading, and longitudinal and transverse cracks. Damage to fills caused by shear failure was considered minor although three slip-outs did develop in very good material. Widespread settlement at bridge approaches occurred on all freeways surveyed for damage.

Pub. Sep. 71, 57p., NTIS No. PB-204 369; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

### 3.0013, INVESTIGATION OF GROUND MOTION-DAMAGE RELATIONSHIPS FOR RESIDENTIAL BUILDINGS IN GLENDALE, CALIFORNIA- SAN FERNANDO EARTHQUAKE, FEBRUARY 1

I. FARHOOOMAND, John A. Blume & Associates, San Francisco, California

The investigation of the relationship between the observed damage to the residential buildings in two selected control areas within Glendale, California, and the ground motion resulting from the San Fernando earthquake is presented. The procedures used in performing the structure inventory and the damage survey are described. The ground motion characterization, structure idealization, and damage description used to derive the ground motion damage relationships are also given. Results of the investigation are ground motion-damage relationships for overall building damage as well as for building components. One of the more significant conclusions is that interior walls and chimneys are more susceptible to damage than other building components.

### 3.0014, RESPONSE OF TWO IDENTICAL SEVEN-STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

S.A. FREEMAN, John A. Blume & Associates, San Francisco, California

The results of the structural dynamic investigation of two seven-story reinforced concrete frame structures are presented here. The structures are both Holiday Inn motor hotels that are essentially identical: one is located about 13 miles and the other about 26 miles from the epicenter of the February 9, 1971, San Fernando earthquake. Appreciable nonstructural damage as well as some structural damage was observed. Strong-motion seismic records were obtained for the roof, intermediate story, and ground floor of each structure. The analyses are based on data from the structural drawings, architectural drawings, photographs, engineering reports, and seismogram records obtained before, during, and after the San Fernando earthquake. Both structures experienced motion well beyond the limits of the building code design criteria. A change in fundamental period was observed for each structure after several seconds of response to the earthquake, which indicated nonlinear response. The analyses indicated that the elastic capacity of some structural members was exceeded. Idealized linear models were constructed to approximate response at various time segments. A method for approximating the nonlinear response of each structure is presented. The effects of nonstructural elements, yielding beams, and column capacities are illustrated. Comparisons of the two buildings are made for ductility factors, dynamic response characteristics, and damage. Conclusions are drawn concerning the effects of the earthquake on the structures and the future capacities of the structures.

Pub. Oct. 73, 70p., NTIS No. JAB-99-98; PC \$5.45 MF \$1.45

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0015, OBSERVATIONS OF DAMAGE TO GLENDALE SWIMMING POOLS, MOBILE HOMES, AND COMMERCIAL BUILDINGS RESULTING FROM SAN FERNANDO EARTHQUAKE OF 1971

W.H. NELSON, John A. Blume & Associates, San Francisco, California

No summary has been provided to the Smithsonian Science Information Exchange.

Pub. Oct. 72, 57p., NTIS No. JAB-99-91; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0016, SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW RISE BUILDINGS - COLORADO

R.E. SCHOLL, John A. Blume & Associates, San Francisco, California

The Rio Blanco event, a nuclear gas stimulation experiment in Northwestern Colorado, provides a unique opportunity to examine the response of low rise buildings to strong motion excitation and to correlate these changes with seismic ground motion histories. The measurement program involves determining the response of twelve low rise structures of varying construction quality and techniques located at varying distances from an underground nuclear detonation. The recorded data will be digitized and a preliminary analysis will be performed to determine the quality of the data.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0017, DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

The results of an earthquake damage field survey conducted after the Feb. 9, 1971 San Fernando earthquake are summarized. The survey was performed to collect data regarding earthquake damage or lack of damage to structures, systems, and equipment relating to nuclear power plant components whose function is safety related. The survey covered dams, embankments, and channels; communication systems; electrical substations, switching and transmission facilities; mechanical and electrical equipment including generators, piping systems, and emergency power generating systems; piping systems; structures including highway overpasses, power houses, tanks, and stacks; and underground utilities and tanks. Recommendations for future analytical studies are presented.

Pub. Mar. 71: 87p., NTIS No. JABE-DRS-1: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0018, STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA EARTHQUAKE OF JUNE 21, 1967

UNKNOWN, John A. Blume & Associates, San Francisco, California

An earthquake with three primary shocks of Richter magnitudes 5.4, 5.6, and 5.4 (U.S. Coast and Geodetic Survey) occurred 15 kilometers east southeast of Fairbanks, Alaska, on June 21, 1967. The earthquake caused slight to moderate damage to structures in Fairbanks and at nearby Ft. Wainwright. Ground motion was felt over an area of 90,000 square miles, extending as far as Anchorage, 415 kilometers to the southwest. The Fairbanks earthquake was assigned a maximum Modified Mercalli intensity of VII by the U.S. Coast and Geodetic Survey. The three primary shocks evidently had the same epicenter location, 64.8 degrees N, 147.7 degrees W. Aftershocks, which continued for several days, had a common epicenter which was located close to the epicenter of the three major shocks. Damage reported consisted essentially of cracked and displaced walls, broken panes of glass, and fallen ceiling tiles and panels. No street damage was reported, although there was one case of earth subsidence at Ft. Wainwright.

Pub. Mar. 70: 39p., NTIS No. JAB-99-51: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0019, ENGINEERING SEISMOLOGY

L.R. ALLDREDGE, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (22390523)

Technical objective: To investigate the effects of strong earthquake ground motions on man-made structures and to correlate those results with studies of ground breakage--both primary faulting and secondary breakage--in an effort to minimize the loss of life and property in future large earthquakes.

Approach: Conduct prompt, on-the-spot field investigations of the effects of strong earthquakes as seen from a seismo-tectonic viewpoint; develop improved techniques to identify primary fault breakage and secondary surficial effects of similar appearance, and to correctly differentiate one from the other; interpret detailed damage patterns from strong and destructive earthquakes in terms of ground breakage effects; continue efforts to expand the overall dynamic recording

celerations seen at several places lends further credibility to the unusually high accelerations recorded at Pacoima Dam.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 3.0020, SEISMIC RISK - FDAA - WASHINGTON AND UTAH

S.T. ALGERMISSIN, U.S. Dept. of the Interior, Geological Survey, Boulder, Colorado 80302

Prepare intensity maps for the postulated damaging earthquakes. Prepare a report on the potential damage, probable casualties, and evaluation of debris clearance for use by disaster relief agencies.

Maps indicating the estimated distribution of Modified Mercalli intensity in the Puget Sound area in the event of the occurrence of magnitude 7 earthquakes (1) near the hypocenter of the 7.1 shock of 1949, and, (2) near the hypocenter of the magnitude 6.5 shock of 1965, are nearly completed.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0021, PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

F.E. MCCLURE, U.S. Dept. of Hou. & Urb. Dev., Off. of Policy Dev. & Res., Washington, District of Columbia 20410

Abstract: The report presents the results of an in-depth engineering study of 169 single family dwellings damaged in the 1971 San Fernando earthquake selected in such a manner as to provide data for evaluation of present HUD accepted methods of single family structure location, site planning, engineering, structural design and construction. In addition to the analysis of the damage dwelling survey data, the conclusion and recommendations in this report are based on inspection of damaged dwellings immediately following the earthquake, review of dwelling damage reports prepared by others and interviews with building officials, contractors and dwelling owners.

Pub. May 73: 148p., NTIS No. PB-226 293/9: PC \$9.50 MF \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 3.0022, REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV)

J.V. COYNE, Public Administration Service, Chicago, Illinois 60637

This current inquiry has been directed primarily to the experience of the California earthquake of February 9, 1971, as it sheds light on three types of economic impact which have been the subject of complaint or representations: the middle-income citizen whose disaster losses are heavy, the damaged private, nonprofit community hospital, and the private contractor who has public facilities under construction when they suffer disaster damage.

Suggestions for dealing with these situations have been made against a backdrop of what has been judged to be the currently accepted role, policy, and purpose of the Federal Government in disaster relief.

3.0024,

*A.J. SCHIFF*, Purdue University, School of Aeronautics, Lafayette, Indiana 47907

The San Fernando Valley Earthquake (SFVE) of February 9, 1971, subjected many works of man in the affected areas to a severe test of their resistance to earthquake damage. It served as a poignant reminder that existing specifications for earthquake design and construction procedures are inadequate. Observation and analysis of the various failures has provided an opportunity to evaluate and improve upon existing procedures.

This report is concerned with the impact of earthquakes on electric power systems, with particular attention focused on the following three areas: (a) The effects of an earthquake on the power network in the Western States. (b) The failure of subsystems and components of the power system. (c) The loss of power to hospitals.

Pub. Jan. 72; 76p., Report 72-1.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0024, STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX B

*S.T. ALGERMISSEN*, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

Abstract: The report presents a methodology for the computation of losses to residential dwellings in California resulting from earthquakes.

Pub. 1969; 70p., NTIS No. COM-71-00054; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 3.0025, THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969

*K.V. STEINBRUGGE*, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

Abstract: Santa Rosa, Calif., was damaged at 9:57 p.m. (Pacific daylight time) on Oct. 1, 1969, by a magnitude 5.6 earthquake located very close to the city. Later the same evening at 11:20 p.m. a second earthquake also centered near the city and having a 5.7 magnitude, created additional damage. Since repairs obviously could not be made between earthquakes, since the damage was cumulative, the two events should be considered as a single series of earthquakes from a damage standpoint. The Santa Rosa earthquakes of Oct. 1 are of substantial engineering interest because of disproportionate damage to earthquake-resistant buildings and because of the concentration of dwelling damage into a relatively small area, among other reasons. The recent marked increase in public interest in earthquakes has also focused attention on the damage in Santa Rosa. Thus, the engineering and scientific findings, as well as the recommendations developing from these earthquakes, may well have a greater-than-usual impact on public policy. This report is essentially directed toward the engineering aspects of the earthquakes.

Pub. 1970; 113p., NTIS No. COM-71-00130; MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 3.0026, DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE

matrices, showing the relationships of resistance, intensity of ground shaking and given separately for steel and concrete to the various structural and nonstructural elements described separately. The difficult problem of data is explained, and suggestions are made for future earthquakes.

Pub. April 73; 199p., Optimum Seismic Design and Damage Statistics Report No. 1, Dept. of Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass.

Abstract provided by FDAA

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0027, LOW CYCLE FATIGUE FAILURE OF STRUCTURES

*E. KASRAJ*, Univ. of New Mexico, Dept. of Civil Engineering Research, Albuquerque, New Mexico 87131

Abstract: Low cycle fatigue damage for single degree of freedom systems subjected to the El Centro (1934 and 1940), Oldbratt (1952) earthquakes. Maximum displacement, maximum strain, and fatigue failure criteria are also considered. Deflection and maximum strain rate are also considered. Simple frame with rectangular column for reversals of loadings. The load and strain curves are proposed to give the structures having average wide flange hysteresis loops are utilized for finding maximum structure strain variation. The fatigue life and the corresponding cumulative damage is then obtained.

Pub. Sep. 68; 86p., NTIS No. PB 198-37

SUPPORTED BY U.S. Natl. Science Foundation

## DISASTER MITIGATION

### 3.0028, STUDIES OF GROUND MOTION DURING EARTHQUAKES

*B.A. BOLIN*, Univ. of California, School of Civil Engineering, California 94720

The aim of this work is to enhance the scientific and engineering questions of the ground during substantial earthquakes. We are concerned with parameters of earthquake motion, such as the duration of ground velocity, and such as the duration of ground acceleration, and geological and seismological considerations are involved in understanding of rupture dynamics on the basis of the effect of geological structure. Detailed studies will be pursued in seismicity and the historical record in seismicity and the historical record in seismicity and the historical record in seismicity. The aim of this work is to enhance the scientific and engineering questions of the ground during substantial earthquakes. We are concerned with parameters of earthquake motion, such as the duration of ground velocity, and such as the duration of ground acceleration, and geological and seismological considerations are involved in understanding of rupture dynamics on the basis of the effect of geological structure. Detailed studies will be pursued in seismicity and the historical record in seismicity and the historical record in seismicity. The aim of this work is to enhance the scientific and engineering questions of the ground during substantial earthquakes. We are concerned with parameters of earthquake motion, such as the duration of ground velocity, and such as the duration of ground acceleration, and geological and seismological considerations are involved in understanding of rupture dynamics on the basis of the effect of geological structure. Detailed studies will be pursued in seismicity and the historical record in seismicity and the historical record in seismicity.

*P. CHAKRABARTI*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Influence of hydrodynamic interaction on the dynamic behavior of dams is reduced to two dimensions; the material behavior is assumed to be linearly elastic. For analysis in the frequency domain, the system is considered as two substructures: (1) the dam as a finite element system and (2) the reservoir's fluid as a continuum of infinite length upstream governed by the wave equation. The displacements of the dam including hydrodynamic effects are expressed in linear combination of the modes of vibration of the dam with the reservoir empty. The analysis produces exact results if all modes of vibration are included; however it effectively produces excellent results by considering only the first few modes, thus drastically reducing the number of unknowns. Numerical results for complex frequency responses and responses to earthquake ground motions show: (1) hydrodynamic interaction and compressibility of water must be considered to obtain accurate results for the periods of vibration and response to earthquakes, (2) water in the reservoir significantly increases the lateral displacements from earthquake motion; however, the stresses may not increase, depending on the ground motion frequency characteristics, and (3) compared to many classes of structures, the vertical component of ground motion is more important in the response of gravity dams.

Pub. Dec. 72: 172p., NTIS No. AD-762 330: PC \$6.00 MF \$0.95.

SUPPORTED BY University of California

### 3.0030, EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS INCLUDING FOUNDATION INTERACTION

*A.K. CHOPRA*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Efficient methods for dynamic analysis of response of multistory buildings including foundation interaction to earthquake ground motion are presented. The system considered is a shear building on a rigid circular disk footing attached to the surface of a linearly elastic half-space. In the first method, structural displacements are transformed to normal modes of vibration of the building on a rigid foundation. The analysis procedure is developed and numerical results are presented to demonstrate that excellent results can be obtained by considering only the first few modes of vibration. The second method developed is based on the Ritz concept. The structural displacements including those at the base are expressed as a linear combination of Ritz Vectors, which are selected as the first few modes of an associated building-foundation system. Numerical results are presented to demonstrate the effectiveness of this approach.

Pub. Jun. 73: 49p., NTIS No. PB-222 970/6: PC \$3.00 MF \$1.45.

SUPPORTED BY University of California

### 3.0031, EARTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS

*A.K. CHOPRA*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Including reservoir interaction effects, the response of

in the fundamental mode. Four cases were considered: dam alone (without reservoir), reservoir-dam system -- interaction neglected, reservoir-dam system -- interaction included, and reservoir-dam system -- interaction included but water compressibility neglected. Expressions were derived for the complex frequency response functions for the dam displacement and lateral hydrodynamic force in each of these four cases. These results along with the Fast Fourier Transform algorithm were utilized to compute the time-history of responses of 28 reservoir-dam systems to the Taft earthquake.

Pub. Jan. 70: 40p., NTIS No. AD-709 640: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0032, ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION

*R.W. CLOUGH*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

This is a continuation and expansion of work initiated under previous NSF grants. The program of activities includes testing of structural components such as reinforced concrete beams and beam-columns, reinforced concrete beam and column subassemblies and reinforced concrete frames with spandrel walls. The moderate size earthquake simulator will be used to verify, extend and modify analytic understanding of the earthquake response of steel rigid and braced frames, reinforced concrete bare frames, reinforced concrete frames with shear or infilled walls and masonry structures. The results of these experimental activities will be correlated with theory and compared with results of a separate field test program. Concurrent analytic research will be directed toward developing computational procedures with which engineers can predict the inelastic response of real structures under strong earthquakes, the amount of damage likely to be inflicted, and the possibility of complete collapse, with sufficient accuracy and economy for practical purposes.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0033, STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES

*M.K. KAILL*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Complexities of stochastic analysis of offshore towers include nonlinear effects due to coupling of the hydrodynamic drag forces with structural response, non-linear effects due to hysteretic force deformation relations to the tower, and non-stationary random excitation and response. They are overcome by introducing certain approximations not affecting the numerical results seriously. Semi-closed form solutions are derived for the time dependent variances of response. Passing shot noise through a second order linear filter simulates ground acceleration. Internal tower forces are generated using linear and bilinear hysteretic relations, resulting in a full stiffness matrix where the tridiagonal terms are time dependent to account for hysteretic effects. Finally equivalent linearizations lead to a system of first order non-linear differential equations with the time dependent variances of response as the unknown, which are determined as

3.0035,

C. LIAW, Univ. of California, Earthquake Engin. Res. Ctr.,  
Berkeley, California 94720

**Abstract:** A general method for linear analysis of response of axisymmetric towers, partly submerged in water, to earthquake ground motion is presented. Based on results of the first part of this investigation in which the basic mechanism of structure-water interaction is studied, water is treated as incompressible in the analysis. The effects of surrounding water on the earthquake response of towers are studied. It is demonstrated that these effects are generally significant.

Pub. Oct. 73: 176p., NFIIS No. AD-773 052/6: PC \$5.50 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0035, SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE RESPONSE ANALYSIS OF HORIZONTALLY LAYERED SITES

*P.B. SCHNABEL*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract.** The program computes the response in a horizontally layered soil-rock system subjected to transient, vertical travelling shear waves. The method is based on Kanai's solution to the wave equation and the Fast Fourier Transform algorithm. The motion used as basis for the analysis can be applied to any layer in the system. Systems with elastic base and with variable damping in each layer can be analyzed. Equivalent linear soil properties are used with an iterative procedure to obtain soil properties compatible with the strains developed in each layer. A varied set of operations of interest in earthquake response analysis can be performed.

Pub. Dec. 72: 105p., NHS No. PB-220 207/5 PC \$3.00 MF \$0.95.

SUPPORTED BY University of California

### 3.0036, EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS

A.K. PAISH, Univ. of California, Earthquake Engin. Res. Ctr.,  
Berkeley, California 94720

**Abstract.** A computationally efficient procedure for the linear earthquake analysis of structure-foundation systems is developed, which is specially suited to finite element solutions of complex shaped structures on large, layered foundations. The procedure is very general in scope, being applicable to a large variety of structure-foundation interaction problems. An explicit formulation of the procedure is presented for a plane strain idealization of a dam foundation system. The procedure utilizes a substructure approach. The foundation is analyzed first, independently of the structure, to obtain its frequency dependent compliance characteristics at the connection nodes with the structure. Equations of motion for the structure are then written in the frequency domain incorporating the effect of the foundation, the input to the problem being the freefield motion of the structural base. The substructure approach allows a more detailed modelling of the structure.

Pub. May 73: 141p., NTIS No. AD-766 272/9. PC \$4.50 MF \$1.45.

SUPPORTED BY U.S. NAVY CONTRACT N00019-80-2-1001

earth under static loading conditions, the possible effect of an earthquake is available by which even approximate funds are therefore required to effect forced earth into the area of seismic. Objective is to develop a method which the stability of reinforced earth structure loading conditions. The studies will Analytical including both precedents, using a finite element method, on scale structures built on a sliding table, two prototype retaining walls and one type of seismic loading. A final analysis will be used in evaluating properties for the soil and reinforcing in construction techniques. The results studies will be checked against expected from sliding table tests only. One of more large prototype reinforced be built at the UCLA field station, both static and artificially induced, monitored and compared with the developed analytical method. While mainly with reinforced earth retaining that the results will have wide application soil and soil structure problems under loading conditions. There would include possible use of reinforcing in applications.

SUPPORTED BY U.S. NAVAL SURVEILLANCE CENTER

### 3.003B. IMPACT VIBRATION DYNAMICS DESIGN

AL MURKIN, Univ. of Southern California  
 Los Angeles, Calif. 90089, U.S.A.

The program will contain a comprehensive experimental study to investigate the response of freedom systems presented with multiple particle impact dampers to forced excitation with the following objectives: the non-stationary random response of the response of system equipped with multiple effectiveness and operating conditions and multiple impact dampers will be investigated the behavior of particle dampers ascertain the optimum combination of various operating conditions. The response characteristics of multi-degree provided with impact dampers and graphical form suitable for design of response of multi-degree of freedom impact dampers to sinusoidal and triparticular recorded earthquake with the results to earthquake excited multi-deg-

SUPPORTED BY U.S. NAVY SPONSORED

3.0039, REGIONAL COUNCIL OF  
ANDREAS LAUREL CALIFORNIA

J. W. DUBBELL, U. S. Dept. of the Interior  
Mineral Resources Division

piled onto four specially prepared 1:125,000-scale topographic base maps, each covering a 125-km long segment of the San Andreas fault. Each of these geologic maps will be accompanied by several cross sections and descriptions of the rock units. Also planned for publication are several 1:62,500-scale quadrangle transects astride certain critical parts of the fault.

The basic geology mapped throughout this area will serve many purposes, such as location of materials suitable for construction of highways, canals, and dams; location of geologic hazards such as faults, landslides, and unstable rock units; and classification of land and exploration for water, petroleum or gas and mineral deposits.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0040, MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA

H.C. SHAH, Stanford University, School of Engineering, Palo Alto, California 94305

During the first year of study dynamic measurements were made on buildings in San Francisco, Palo Alto and Los Angeles, and on a suspension bridge in Sacramento. Measurements of structures will be continued under ambient conditions to determine (1) the effect of occupancy on the dynamic characteristics, (2) the variation in dynamic characteristics for similar buildings, (3) the relationships between the frequencies and modal damping values at ambient force levels to those for strong motions, and (4) the relationships between analytical predictions and results obtained from ambient measurements. The dynamic characteristics to be studied include accelerations, displacements, natural frequencies, spectra, transfer functions, etc.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0041, EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS

J. BIELAK, Calif. Inst. of Technology, Earthquake Engin. Res. Lab., Pasadena, California 91109

Abstract: The investigation on the dynamics of soil-structure interaction was divided into two parts for convenience of analysis and presentation. In Chapter I, the forced horizontal, rocking and vertical harmonic oscillations of a rigid disc perfectly bonded to an elastic half-space were studied. The effect of a deformable foundation on the response of a building to earthquake excitation was studied in Chapter II. The base of the building was idealized as a rigid circular plate attached to the surface of the ground, and the soil was modeled by a homogeneous, isotropic, elastic half-space. Using the force-deflection relations for the base derived in Chapter I, The equations of motion of an n-story building-foundation system were solved by both direct and transform methods. For special case of a single-story building on a flexible foundation, approximate explicit formulas were obtained for the effective natural frequency, critical damping ratio, and the amplitude of the modified excitation in terms of the dimensionless parameters which govern the behavior of the system.

Pub. 1971: 153p. NTIS No. PB-205 305: PC \$3.00 MF \$0.95.

During the completion of the grant GK-28182, an unprecedented amount of strong motion data has been collected from the San Fernando Earthquake and several of its larger after shocks. This data has been collected and digitized; however, it has not been analyzed and published. This grant will complete the analysis of the majority of the San Fernando records and publish them with the appropriate analysis. The analysis of the records will include the integration of the acceleration to obtain velocity and displacement histories.

Damped spectra will be obtained for both the velocity and acceleration functions. These calculations are an integral part of the analysis of the earthquake's effect on structures. Their timely completion and dissemination will prove invaluable to the research and professional engineers. In addition to the San Fernando records, several records obtained from previous earthquakes by the same instrument net will be processed. These records will be useful in comparative studies of the effects of different source and site mechanisms on the response of structures.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0043, DYNAMICS OF BUILDING-SOIL INTERACTION

P.C. JENNINGS, Calif. Inst. of Technology, Earthquake Engin. Res. Lab., Pasadena, California 91109

Abstract: In this study of the dynamics of building-soil interaction, the soil is modeled by a linear elastic half-space, and the building structure by an n-degree-of-freedom oscillator. Both earthquake response and steady-state response to sinusoidal excitation are examined. The results show that interaction tends to decrease all resonant frequencies, but that the effects are often significant only for the fundamental mode for many n-story structures and are more pronounced for rocking than for translation. If the fixed-base structure has damping, the effects of interaction on the earthquake responses are not always conservative, and an increase or decrease in the response can occur, depending on the parameters of the system.

Pub. Apr. 72: 81p., NTIS No. PB-209 666: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0044, GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS

J.B. SEED, Calif. Inst. of Technology, Graduate School, Pasadena, California 91109

Abstract: The report summarizes the findings of the Natural Hazards Review Panel whose mission it was to investigate the nature and magnitude of the threats posed to Naval bases by earthquakes and earthquake-related natural hazards including tsunamis, seiches (and the accompanying flooding), landslides, mudflows and soil foundation failures which may result from earthquakes. In addition to citing specific problems for Naval bases in the San Francisco, San Diego and the Manila areas, the introduction to this report recommends conducting a rapid visual survey initially to pinpoint the nature of various danger areas. It then recommends the follow-on procedure leading to various strategic and en-



**3.0045, ANALYSIS OF COUPLED SHEAR WALLS AND SANDWICH BEAMS**

**K.S. SKATTUM**, Calif Inst of Technology, Earthquake Engin. Res. Lab., Pasadena, California 91109

**Abstract:** A study is made of the free vibration of planar coupled shear walls, a common lateral load-resisting configuration in building construction where two walls are coupled together by a system of discrete spandrel beams. The differential equations and boundary conditions are obtained by assuming that the spandrels can be replaced by a continuous system of laminae, or small beams. Natural frequencies and mode shapes are determined, the importance of including vertical displacement in the analysis is discussed, and a study of the effect of neglecting the vertical inertia term is given. These cases are illustrated with graphs and with one specific example. Investigations are also made of the asymptotic behavior of the system as the spandrels become weak, as they become stiff, and as the frequencies become large. Finally, the theory of sandwich beams is presented and compared to that for coupled shear walls.

Pub. May 71. 192p., NTIS No. PB-205 267; PC \$3.00 MF \$0.95

**SUPPORTED BY** California Inst of Technology - Pasadena

**3.0046, MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SWITCHYARD EQUIPMENT**

**A.E. ASKEL**, State Dept. of Water Resources, Sacramento, California 95802 (DWR)

The objective of this program is to find means of improving the earthquake resistance of electrical apparatus located in switchyards near the power and pumping plants along the California Aqueduct where major seismic disturbances may occur. In addition, the information obtained will be applied to future designs of a similar nature.

Phase I of the program is to evaluate the seismic response of the electrical apparatus. To accomplish this, a field testing program was undertaken to determine the dynamic characteristics of the following switchyard electrical apparatus: Lightning arrestors, 230 KV air circuit breakers, disconnect switches, coupling capacitor potential device, bus supports, line trap, and oil circuit breaker. This phase of work is completed and was accomplished by the use of a Hewlett-Packard 5525A Laser Interferometer, a recently developed machine, capable of measuring acceleration responses, natural frequencies and damping characteristics. Dynamic field testing of unmodified switchyard electrical apparatus has been basically completed. Additional testing of critical power and pumping plant equipment will be performed.

Phase II work consists of testing some of the aforementioned electrical apparatus with modifications using energy absorbing dampers to improve their earthquake shock resistance. Testing of modified switchyard electrical apparatus using energy absorbing dampers to improve earthquake shock resistance has been underway.

**SUPPORTED BY** California State Government - Sacramento

**3.0047, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

**J.T. ALFORE**, State Div. of Mines & Geology, Sacramento, California 95814

**Abstract:** This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an esti-

mated \$100 million in annual losses from erosion, soil, fault hazards, tsunami hazards, and other hazards. The report describes the nature, distribution, and frequency of these problems, as well as costs and effective reduction measures, and agencies responsible.

Pub. Jun 73: 111p., NTIS No. PB-222 145

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

**3.0048, COMPARISONS OF SEISMIC RESPONSE OF TWO IDENTICAL STRUCTURES DERIVED FROM THE SAN FERNANDO (ABBREV)**

**S.A. FREEMAN**, John A. Blume & Associates, San Francisco, California

No summary has been provided to the information Exchange.

Pub. 1972: 26p., NTIS No. CONF-72 09.95

**SUPPORTED BY** No Formal Support

**3.0049, TSUNAMI RESEARCH**

**S.T. ALGERMISSEN**, U.S. Dept. of the Interior, Research Laboratories, Boulder, Colorado

**Technical objective:** Through analysis of tsunami mechanisms, establish the causative mechanisms, generation. Once done, the incorporation of this understanding into the tsunami warning system will strengthen the warning capability of the system.

**Approach:** Refine the statistical and physical models of earthquake fault mechanisms are such that meaningful correlation with tsunami can be observed.

**Progress:** Both the statistical and physical models of earthquake fault mechanisms have been refined. This is being documented in several journal articles.

**SUPPORTED BY** U.S. Dept. of Commerce

**3.0050, TETON DAM SEISMICITY - A STUDY OF THE TETON DAM, W.V. MICKEY**, U.S. Dept. of the Interior, Research Laboratories, Boulder, Colorado 80302

**Compile, study, interpret and report the seismicity of the Teton Dam area before, during and after construction. Determine if the seismic environment is altered by the dam. To determine if the existing seismicity is a potential hazard to the dam and its reservoir.**

**Provides localized seismic information for the Teton Dam area otherwise be unavailable. This would be used in the overall National Seismicity Studies to determine the damaging earthquakes.**

**SUPPORTED BY** U.S. Dept. of Interior

**3.0051, NATIONAL EARTHQUAKE HAZARD STUDY (ABBREV)**

**A.C. TARR**, U.S. Dept. of the Interior, Research Laboratories, Boulder, Colorado 80302

The NEIS serves as a focus for seismological research and an international group of cooperating nations. Three principal services are provided: 1) to users in the scientific, governmental,

collected from a global network of seismograph stations. This forms a data base for a substantial part of research in seismology. 2. Information Services: NEIS performs a clearing-house function for general information about the earthquake phenomena, risk, and other aspects which cannot be provided through routine publications. 3. Earthquake Alerting Service: Provides accurate information on the location, magnitude, and relevance of all large and damaging earthquakes and fills a need for notification to disaster relief agencies, scientists and the public.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0052, COAL MINE DEFORMATION STUDIES, SOMERSET, COLORADO

C.R. DUNRUD, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Colorado.

Determine which geologic features and engineering properties of rocks control mine deformation problems, such as (1) subsidence, (2) roof falls, and (3) coal mine bumps or rock bursts, so that future mining can be safer and more efficient, with a minimum of damage to the environment and maximum utilization of coal reserves. 1. Make a detailed engineering geologic map of proposed or current mining areas of the Somerset district, Colorado, at 1:12,000. Map structural and lithologic features and physical properties of coal and rock in selected mine workings, and determine their effects on bumps and rock bursts. 2. Make periodic subsidence measurements and deformation maps or profiles of surface areas above producing coal mines and determine how the processes are controlled by geology and mine geometry. 3. Monitor the seismic activity in the Somerset district and determine its relation to mine deformation and coal production. 4. Study processes of natural arches under various loads and lateral confinement and in various geologic environments to serve as an aid in designing more stable underground openings.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0053, COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM

L.H. ROEHM, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

Abstract: Forced vibration tests were made on Monticello Dam to obtain natural frequencies, mode shapes, and damping ratios for the structure. Outlined is the analytical method used to determine computed values for natural frequencies and mode shapes so that experimental and computed data can be compared. Also compared are crest deflections determined from accelerations measured during the tests with computed deflections. The results of the investigation indicate that the analytical method discussed in the report is satisfactory for estimating earthquake loadings for concrete arch dams, where the loadings include the effects of structural resonance.

Pub. Dec. 71: 16p., NTIS No. PB-205 410; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

### 3.0054, EARTHQUAKES RELATED TO RESERVOIR

served, in other countries, have caused loss of life and significant damage. With increasing population and the corresponding increase in the demand for water and other services, it now seems wise to review all aspects of the problem to determine what additional information is needed to evaluate the hazard. The report summarizes the history of recorded correlations, discusses the scientific considerations, and makes recommendations designed to improve our understanding of the problem. The recommendations concern specific geologic, geodetic, and seismic studies -- before, during, and after the filling of large reservoirs -- that can provide the required information.

Pub. Jan. 72: 30p., NTIS No. PB-208 327; PC \$3.00 MF \$0.95.

SUPPORTED BY Natl. Academy of Sciences - Washington

### 3.0055, ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO EARTHQUAKE

H.S. LEW, U.S. Dept. of Commerce, Building Research Div., Washington, District of Columbia 20234

On February 9, 1971, shortly after an earthquake struck the San Fernando, California area, the National Bureau of Standards was requested by the Office of Emergency Preparedness to send a team of engineers to the disaster area for the purposes of making observations and preparing reports relative to structural damages. A team of structural engineers from the Building Research Division, Institute for Applied Technology, National Bureau of Standards, was dispatched immediately to the disaster area.

This report presents the observations of the NBS on-site inspection team (most photographs in this report were taken by the team). The material presented herein is intended to serve as (1) a documentation of damage resulting from the earthquake and (2) as a source document for further studies, research, and recommendations. This is particularly important, as necessary remedial work and restoration have resulted in the removal of evidence that is essential for studies and evaluations.

Pub. 1971: 419p., Building Science Series 40; U.S. Govt. printing office, Wash., D.C.; PC \$3.00.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

### 3.0056, HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES

G. DEBUCHANANNE, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Description: Develop geologic and seismologic criteria for evaluating safety requirements for nuclear plant sites. Develop methods of investigation and map presentation of geologic and seismologic features affecting site evaluation. Compile maps portraying geologic, tectonic, and seismologic features pertinent to site selection and evaluation in areas of coastal California, including offshore areas, and in the Eastern U.S. Acquire and publish knowledge of earthquakes, faults, and propagation and amplification of seismic motions.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0057, HAWAIIAN VOLCANO OBSERVATORY

D.W. PETERSON, U.S. Dept. of the Interior, Geological Survey,

of geologic, geophysical, and geotechnical data in order to improve the understanding of volcanic processes. Eruptions are studied in great detail, including describing and recording eruptive events and associated phenomena, sampling eruptive products, making photographic records, and mapping vents and flows. Seismic activity is continuously monitored by a network consisting of about 36 stations. Several thousand earthquakes are recorded annually, and their locations and magnitudes are determined by computer. Vertical and horizontal ground deformation is measured by regularly reoccupying tilt stations, leveling lines, and a trilateration network of geodimeter stations. Additional geophysical methods include resistivity, electromagnetic, magnetic, and gravity studies. Hypotheses of magmatic history and evolution are developed from petrographic and chemical studies of lava samples. Individual types of study are correlated with one another to learn the relations among eruptive behavior, magmatic composition, crustal deformation, and physical properties of the local and regional crust. Improved understanding of volcanic processes is gradually leading to better forecasting techniques.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0058, QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES

G. ESTRADAURIBE, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

Abstract: Different types of structures including frames, shear walls, box systems, chimneys, towers, masts, etc., were simulated by means of a mathematical model. The structural properties of the model such as mass and stiffness matrices were defined using matrix compression techniques. Equations of motion were then formulated and solved using a digital computer to obtain eigenvalues and eigenvectors. Finally, after performing a modal analysis, quasi-static loads were evaluated for the various responses of interest, namely displacements, accelerations, shears, and overturning moments. These forces were such that when applied to the model they would produce an equivalent dynamic response of the structure. The effect of parameters such as earthquake magnitude, rigidity of the structures, shear-flexural ratio, stiffness and mass distribution, and number of stories, upon the responses of the structure were analyzed independently. From the data obtained, a method of predicting a set of design quasi-static lateral loads that would yield responses greater than or equal to those given by a complete modal analysis was developed. The recommended systematic method of predicting quasi-static loads for earthquake resistant structures is presented and illustrated by means of an example.

Pub. Jun 71: 183p., NTIS No. AD-726 693; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

### 3.0059, SEISMIC DESIGN OF LOW-RISE BUILDINGS

W.J. HALL, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

Recent earthquakes near metropolitan areas have shown that many aspects of current seismic design and construction procedures, especially for low-rise buildings, need review and possibly improvement. The research outlined will be aimed at developing simplified methods of analysis for low-rise buildings taking into account the interaction, stiffness and ductility characteristics of infilled frames and changes in these properties associated with deformation of the structures.

SUPPORTED BY University of Illinois

B.O. HARDIN, Univ. of Engineering, Lexington, Kentucky 40506

Abstract: Based on numerous tests on a spectrum of disturbed and undisturbed soils, the shear modulus decreases and the damping ratio increases, very rapidly, with increasing strain amplitude. The rate of increase or decrease depends on many parameters, the most important of which are: effective mean principal stress, degree of saturation, void ratio, and number of cycles of loading. Ambient states of octahedral shear stress, overconsolidation ratio, effective strength envelope, frequency of loading, and time effects have a less important influence on these properties. Cohesive soils are affected differently than clean sands. The shear modulus and damping in soils are important to the analysis of all soil vibration problems. Apparatus used to measure these properties must be capable of making accurate measurements at very small shearing strains, the range being defined by practical problems in earthquake and foundation vibrations. A pseudo-static simple shear apparatus and two different resonant column apparatus were used.

Pub. Jul 70: 52p., NTIS No. PB-193 607; MF \$0.65.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0061, THE FORMULATION AND EXPERIMENTAL VERIFICATION OF MATHEMATICAL MODELS FOR PREDICTING DYNAMIC RESPONSE OF MULTISTORY BUILDINGS

M.H. ACKROYD, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

This is the thirteenth in a series of reports covering research supported by the National Science Foundation under Grants GK-27955 and GI-29936, as part of the program for Research Applied to National Needs (RANN).

The study described in this report was aimed at learning how well the dynamic response of buildings can be predicted theoretically, so as to judge the validity of using theory to estimate damage.

In the design of multistory buildings for lateral loads, the use of mathematical models to predict dynamic response has become an accepted practice. However, the accuracy of the predictions depends primarily on whether the model is formulated correctly for representing characteristics of the actual building. Currently, this formulation is not necessarily a straightforward, well defined process, but depends largely on engineering intuition and experience. This paper surveys the problems experienced in formulation of math models for actual buildings in the past, deduces from these studies suggested modeling guidelines based on success or failure of models investigated. Having proposed guidelines for different types of buildings, a study was made for a 15-story steel frame apartment building in Cambridge, Mass. The study includes experimental measurements of dynamic response to wind over a year's period at various stages of construction, predicted behavior was compared to that observed in the field. Structural and non-structural elements were included to accurately predict response for the small amplitude motion observed.

Pub. May 74: 64p., Seismic Design Decision Analysis Report No. 13; Dept. Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass. 02139 PC \$3.00.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0062, SENSITIVITY ANALYSES AND GRAPHICAL

G. TALEBAGHA, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

This is the fourteenth in a series of reports covering work supported by the National Science Foundation under the program of Research Applied to National Needs (RANN).

A description of the methodology and pilot application to the SDDA problem have already appeared in Report 9. Chapter 2 of this report deals with the sensitivity analyses of the SDDA problem to several parameters. A concise form of the SDDA mathematical formulation using matrix notations is also presented in Chapter 2. A new graphical method for the determination of a suitable design strategy for a given design situation is presented in Chapter 3. Illustrative examples of actual situations are presented in Chapter 4 using the proposed graphical method.

The results of sensitivity analyses of the Seismic Design Decision Analysis problem to the annual risk curve, human life and injury costs and maximum tolerable death rate are presented herein. Two criteria to decision-making were considered: cost-benefit with a dollar cost assigned to life loss and maximum tolerable lives lost ratio.

A new graphical method for the quick determination of a suitable design strategy for a group of buildings of given structural type and general location is presented. The risk curve of the building's location is superimposed on a tone-coded graph of standard risk curves and the optimal design strategy is readily determined. As an illustrative pilot application, the method is applied to the choice of optimal design strategies for multi-story reinforced concrete apartment buildings in Boston, Long Beach, and Paducah for each optimality criteria.

Pub. June 74; 36p., Seismic Design Decision Analysis Report No. 14; Dept. of Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass. 02139.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0063, DAMAGE PROBABILITY MATRICES FOR PROTOTYPE BUILDINGS

R.P. WHITMAN, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

This is the eighth in a series of reports prepared under National Science Foundation Grants GK-27955 and GI-29936.

Starting with this report, a new title has been assigned to the series. Previously the series was called Optimum Seismic Protection and Building Damage Statistics. The new title, Seismic Design Decision Analysis, more aptly indicates the overall objectives of the study. To date, SDDA has been applied only to multi-story buildings. However, the same basic approach can be applied to a wide range of engineered facilities. Use of the words "decision analysis," and omission of the word "optimum," reflects the need to consider human and social values rather than relying solely on cost/benefit analysis.

This report presents damage probability matrices (DPM) for multi-story buildings, developed from various sources by various techniques: Documentation of actual earthquake damage, theoretical analysis, and judgment. This effort was specifically aimed at developing DPM for the pilot application of SDDA to multi-story buildings in Boston. More particularly, the DPM presented in this report are intended to apply to 5 to 20 story buildings with reinforced concrete

similar meanings to the terms UBC O, UBC I and UBC 2. Superzone S denotes a lateral force requirement twice that for Zone 3.

Pub. Oct. 73; 82p., Seismic Design Decision Analysis Report No. 8; Dept. of Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass. 02139.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0064, SUMMARY OF METHODOLOGY AND PILOT APPLICATION

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

This is the ninth in a series of reports covering work supported by the National Foundation under Grants GK-27955 and GI-29936. The paper reproduced in this report is, in effect, a shortened version of Report 10 scheduled for release at the end of 1973. The development of the damage probability matrices is described in detail in Report 8. This paper describes a procedure for balancing cost and risk called Seismic Design Decision Analysis (SDDA). While the procedure potentially has a broad range of application, this paper focuses specifically upon building code requirements. To illustrate the procedure, a pilot application is presented involving buildings of moderate height in Boston.

Pub. Oct. 73; 54p., Seismic Design Decision Analysis Report No. 9; Dept. of Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass. 02139.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0065, STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047)

J.P. BALSARA, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Purpose of study/investigation: To investigate the response of a model concrete arch dam to simulated seismic motions. The results will provide information to verify analysis methods for predicting the response of dams to earthquake motions.

Approach or plan: A 1/24-scale model of the North Fork arch dam will be subjected to vibratory loads at the crest and to vibratory and simulated earthquake motions at the base of the dam. The response of the dam will be studied and experimental results will be compared with analytical predictions.

Progress to date: Tests on the model dam using electromagnetic vibrators mounted on the crest have been completed. The vibrators were run in and out of phase and the water level in the reservoir was varied from full to empty. The data will provide information on mode shapes and the damping characteristics of the dam. Preliminary tests using a closed loop, servo-controlled, electrohydraulic vibrator have been successfully conducted. The vibration test was conducted at constant force levels and swept through its frequency range. A three-dimensional grid for a finite element calculation has been set up. The calculations will be conducted using the SAP code and compared with experimental data.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0066, EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS

and to perform analytical, laboratory, and field studies for improving current Corps of Engineer design procedures.

**Approach:** Principal approaches are identified by consultation with various authorities and noted experts in seismology, soils engineering, dynamic analysis methods, laboratory test procedures, and field exploration techniques. Recommended work items are pursued in the laboratory, full-scale verification tests are undertaken, when appropriate, and related theoretical analysis methods are exercised and examined. Methodology for the analysis and design of earth and rock-fill dams during earthquake-induced motion has been developing over the past decade. Reviews of these developments reveal that at least three schools of thought, regarding concept and approach to the problem, are in vogue. The goal, however, of all the methods is to estimate the permanent deformation of earth dams caused by earthquake motions. Knowledge of the residual dam deformation after an earthquake might indicate the need for additional freeboard, a wider crest, flatter slopes, buttressing berms, additional filters, relief wells, etc. Thus, the research plan for this work unit includes continuing personal liaison with recognized authorities in the field of earthquake engineering and pertinent subspecialties in order to assess the pulse-of-the-art, to be aware of advanced thinking and the results of concomitant research on the subject, and to apply the most promising research aspects to Corps design problems. A suite of sophisticated computer software is continually being assembled along with a maturing and unique laboratory testing program to provide quantitative evaluations of dam behavior during earthquakes.

Because the approach to this work unit requires a continuing assessment of the state of the rapidly developing art of earthquake engineering as applied to soil, rock, and earth-rock mixtures, and to the behavior, stability, and safety of structures composed of these materials under earthquake loading, an a priori listing and scheduling of sequential steps to the stated objective would be inappropriately dogmatic for the necessarily research-oriented approach required for this work unit. (Text Abridged)

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0067, STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS

J.G. JACKSON, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

To determine the effect of percent saturation on wave propagation phenomena in sands, in order to assess the effect of the presence of groundwater on free field stresses and motions caused by a nuclear blast, and to investigate liquefaction potential of soils under the combination of outrunning and locally airblast-induced ground shock. Ground shock due to earthquakes has caused the failure of conventional structures by liquefaction (the formation of a quick-sand conditions), the potential of nuclear blast induced ground shock for causing failure of military installations will be investigated. The relevance of this work is the use of its results for construction of protective structure facilities to prevent such failures and in target analyses as a means of destroying enemy facilities.

A series of wave propagation experiments will be conducted on a medium dense sand in the small blast tests.

tions are applied to the soil specimens. Movement of inclusions covering a wide range of density will be monitored in order to detect any tendency for liquefaction to occur. If possible, an experiment will be designed for a future III field test

Supporting agency address information: OCIE Waterways Experiment Station, Vicksburg, Mi. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0068, STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS

D.P. HILLINGTON, Princeton University, School of Engineering, Princeton, New Jersey 08540

The first phase of this research will focus on bifurcation stability of thin shells of revolution and will consist of analytical studies on: cylindrical shells under wind loading with free top and elastically-supported base; toroidal shells under uniform pressure and under wind pressure with free top and fixed base; hyperboloids under uniform pressure and under wind pressure for simply-supported boundaries and for free top and fixed base. Included will be numerical (finite element) studies on hyperboloids under uniform pressure and under wind pressure for simply-supported boundaries, for free top and fixed base, and for variable thickness cooling-tower type shells with ring top and flexible base.

The second phase will focus on the non-linear, snap-through analysis for thin shells of revolution as well as on transient earthquake analysis and will consist of numerical (finite element) studies on: non-linear analysis of cylinders and hyperboloids to study the influence of the so-called geometric stiffness effects; application of the non-linear analysis to cooling-tower type shells to develop a snap-through analysis for stability; transient earthquake analysis for cooling-tower type shells to include the influence of spacial variations in ground motion. Additional theoretical work on imperfection analysis for toroids to extend previously published work and to prepare for an analysis of the imperfection sensitivity of cooling-tower type shells will also be included.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0069, REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL REPORT

UNKNOWN, Mississippi Ark. Tenn. Council, Memphis, Tennessee

This report describes the seismic risk in the MATCOG/MDDD area. It is written to serve primarily as an aid in the establishment of a public policy regarding earthquake protection. The risk is stated in terms of potential property damages and life losses. Each decade, from the present to the year 2020, is examined considering present construction methods and/or the introduction of more earthquake resistive construction. The geology and seismic history of the region are reviewed. The probabilities of different intensity quakes and a decision theory rationale are used to evaluate the true risk in terms of expected losses.

Pub. Sept. 74, Mass. - Ark. - Tenn. Council of Govt. Memphis Delta Develop. Dept., 125 N. Main St. Room 518, Memphis Tenn. 38103.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

E. BERG, Univ. of Alaska, Geophysical Institute, College, Alaska 99735

**Abstract:** The main purpose of the contract was to gain insight into the crustal failure mechanism and the associated source phenomenon in Alaska. This effort includes the operation of the short-period telemetry network and the three long-period borehole installations used for the measurements of crustal tilts. Through the telemetry system there is now on hand an almost complete record on the seismicity of Central Alaska, covering a total of four years, and of much higher accuracy than was hitherto available. The operation of the borehole long-period seismometer has revealed tilts associated with earthquakes as small as magnitude 3, which are consistent with the tectonic stress axis, but do not seem to conform to elastic fault dislocation models. Analysis of literature suggests that Russian observations of the  $V_p/V_s$  ratio, diminishing by about 0.1 prior to larger earthquakes, can be explained by the decrease in  $V_p/V_s$  ratio due to micro-fracturing (observed in the laboratory) and theoretical as well as experimental work on  $V_p/V_s$  changed as a function of porosity.

Pub. Jan. 71: 77p., NTIS No. AD-719 840: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Air Force

### 3.0071, EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA

L. GEDNEY, Univ. of Alaska, Geophysical Institute, College, Alaska 99735

**Abstract:** The author has identified the following significant results. The sharp bend in the Alaska Range near 65 deg N, 150 deg W is now thought to enclose a corner of the northwesterly migrating north Pacific lithospheric plate. Subduction of the plate beneath the continent is believed, on the basis of hypocentral distribution, to occur along Cook Inlet and the eastern flanks of the Aleutian and Alaska Ranges as far northward as Mt. McKinley. The nature of tectonic deformation here, particularly in the area of the bend in the Alaska Range, is understandably complex. The Denali fault is thought to be of a transform character in the vicinity of Mt. McKinley (i.e., it is thought to be the surface along which the oceanic plate separates from the continental plate). On the ERTS-1 imagery, however, it appears that there are a number of sub-parallel faults which branch off of the Denali fault in a southwesterly direction. Slippage along these would tend to squeeze material around the inside of the bend rather than the plate being directly underthrust. All of these sub-parallel faults are seismically active. The right-lateral fault-plane solution obtained for this event is consistent with the concept of slippage around the bend on a set of sub-parallel faults in the manner postulated. The best images to show these features are 1066-20444 and 1266-20572.

Pub. Jul 73: 13p., NTIS No. E73-10842: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

### 3.0072, INSTALLATION AND OPERATION OF A TELEMETERED SEISMIC NETWORK ON THE ALASKA PENINSULA

UNKNOWN, Univ. of Alaska, Geophysical Institute, Fairbanks, Alaska 99701

### 3.0073, STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS

V.V. BERTERO, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** A method of testing and evaluation of stiffness degradation in the inelastic regions of reinforced concrete beams is presented in this report. Selection, fabrication, instrumentation and testing of specimens are described in detail. Four beams having rectangular cross sections were subjected to different deformation histories including reversed loadings. Test results are presented in terms of hysteresis loops for steel and concrete strains, curvatures and deflection. Effects of deformation history on stiffness, strength, ductility and energy absorption and dissipation are discussed. This report constitutes the first phase of a continuing program of investigation and recommendations for further research are indicated.

Pub. Dec. 69: 128p., NTIS No. PB-202 942: PC \$3.00 MF \$0.95.

SUPPORTED BY University of California

### 3.0074, THE UNPREDICTABLE DISASTER IN A METROPOLIS - PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971

L.B. BOURQUE, Univ. of California, Survey Research Center, Berkeley, California 94704

**Abstract:** A combination of findings on post earthquake public behavior suggests that persons who are outside a certain perimeter following a disaster are given less assistance by disaster agencies and are not defined by others as 'victims' while often experiencing what they themselves consider to be severe emotional damage.

Pub. Jun. 73: 176p., NTIS No. AD-765 513/7: PC \$5.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0075, EARTHQUAKE SAFETY OF SCHOOL BUILDINGS

B. BRESLER, Univ. of California, School of Engineering, Berkeley, California 94720

A large number of school buildings are unsafe if subjected to strong motion earthquakes. It has been estimated that in the U.S. the demolition of the old and construction of the new school buildings to replace the unsafe facilities will require an expenditure of several billions of dollars and cause disruption to school sites and ongoing education. While the unsafe buildings do not meet some of the current standards, it may be possible to modify many of these buildings to bring them up to a safe standard. Compared to demolition and new construction, this represents potential saving of about one-half billion dollars, conservation of open space and existing school sites, and preservation of community landmarks. In this study various types of school buildings and typical problems in earthquake safety will be identified and current criteria used in evaluating this safety will be reviewed.

**3.0076, EXPERIMENTAL INVESTIGATION INTO THE  
SINUSOIDAL BEHAVIOR OF CRITICAL REGIONS OF REIN-  
FORCED CONCRETE COMPONENTS AS INFLUENCED  
BY MOMENT AND SHEAR**

**M. CHAFFIN** Univ. of California, Earthquake Engin. Res. Ctr.,  
Berkeley, California 94720

**Abstract:** The behavior of reinforced concrete components simulating interior beams with column studs is investigated. The stirrup spacing and shear span to depth ratios of each beam in a series of twelve were varied in order to study their influences on energy absorption and stiffness degrading properties. The beams were loaded by using a hydraulically powered electronically controlled actuator. Similar beams were tested under quasi-static and dynamic conditions. Load-deflection, moment-curvature and shear force-shear deformation types of relationships have been obtained. The results are discussed in terms of energy absorption, stiffness deterioration, strength and deflection ductility. It is concluded that for low nominal shear stress, the spacing requirements of the codes should be relaxed.

Pub. Jan. 74, 185p., NTIS No. PB-215 884/8, PC \$6.00 MF \$0.95

**SUPPORTED BY:** University of California

**3.0077, ADAP - A COMPUTER PROGRAM FOR STATIC  
AND DYNAMIC ANALYSIS OF ARCH DAMS**

**R.W. CROUGH** Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** The development of a finite element computer program for linear static analysis and dynamic earthquake response analysis of arch dam-foundation systems is described. The program uses most of the logical features of the computer program SAP. Three different element types are included in the program; these are considered to be the most suitable elements for use in the three dimensional analysis of arch dam systems. The program generates the finite element mesh of the system from a relatively small amount of input data; performs a static or dynamic analysis of the system and prints out the resulting displacements and stresses. The dynamic part of the program uses special numerical procedures which are shown to be very efficient in the analysis of arch dams. The report includes a brief description of the elements, a study algorithm and the analysis capabilities of the program. Finally the application of the program to the static and earthquake response analysis of the Morrow Point dam is demonstrated.

Pub. Jun. 73, 182p., NTIS No. PB-223 763/4, PC \$11.25 MF \$1.45

**SUPPORTED BY:** University of California

**3.0078, NONLINEAR ANALYSIS OF REINFORCED  
CONCRETE FRAMES AND PANELS**

**H. L. FRANKLIN**, Univ. of California, School of Engineering,  
Berkeley, California 94720

**Abstract:** An analytical procedure is developed which utilizes quadrilateral, linear strain finite elements, special frame elements, axial force rod elements, and bi-directional tie link elements in order to study two-dimensional reinforced concrete frames with attached shear panels which are subjected to three lateral forces. During the incremental loading procedure, allowance is made for the cracking and destruction of concrete elements with redistribution of stresses in the surrounding structure by iterating the solution within each load increment. The tie links are used to connect the

elements under a general anisotropy for describing cracked element, but assumes the uncracked elements to be isotropic. Material constitutive relations are not modified for the biaxial stress state. This method of analysis is applied to a set of test examples and to frame-and-panel models. Predictions of cracking, stress patterns, and deformations are compared to experimental results where possible.

Pub. Mar. 70, 275p., NTIS No. PB-191 937, HC \$3.00 MF \$0.65

**SUPPORTED BY:** U.S. Natl. Science Foundation

**3.0079, GENERAL PURPOSE COMPUTER PROGRAM  
FOR INELASTIC DYNAMIC RESPONSE OF PLANE  
STRUCTURES**

**A.E. KANANIAN**, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** A computer program for the dynamic response analysis of inelastic plane structures of arbitrary configuration is described. The program consists of a series of base subroutines which carry out a step-by-step dynamic analysis. Subroutines for structural elements of a variety of types may be developed independently and added to the base program. Subroutines for arbitrarily oriented truss elements, arbitrarily oriented beam-column elements, infill shear panel elements and semi-rigid connection elements have been developed and are described. The direct stiffness method is reviewed, with particular emphasis on the selection of displacement and deformation degrees of freedom. The step-by-step dynamic analysis procedure for inelastic structures is considered in detail. Instructions to be followed when adding new elements to the program are presented.

Pub. Apr. 73, 166p., NTIS No. PB-224 260/3, PC \$6.00 MF \$0.95

**SUPPORTED BY:** U.S. Natl. Science Foundation

**3.0080, SEISMICITY OF MENDOCINO ESCARPMENT-  
GORDA RIDGE REGION - CALIFORNIA**

**E.G. KLITH**, Univ. of California, Seismographic Station,  
Berkeley, California 94720

**Abstract:** The aim of the study was to study in more detail the earthquakes in Northern California using enhanced recording facilities. The main interest was in the regional seismicity related to the tectonics of the region of the San Andreas Fault-Gorda and Mendocino escarpments-Cascade and Klamath Mountains; the regional crustal structure related to earthquake depth and mechanism; and the seismic risk of Northern California.

Pub. Sep. 71, 15p., NTIS No. AD-739 759, PC \$3.00

**SUPPORTED BY:** U.S. Dept. of Defense - Navy

**3.0081, CONSTITUTIVE MODELS FOR CYCLIC PLASTIC  
DEFORMATION OF ENGINEERING MATERIALS**

**J.M. KELLY**, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Incremental methods are currently being developed to solve transient problems of structures subject to earthquake excitation. A general continuum theory of dislocation motion is used to investigate the response of crystalline solids to cyclic straining in uniaxial tension and compression. For macroscopically homogeneous deformation under uniaxial stress a simple one-dimensional equation suffices to relate the plastic strain rate to dislocation flux. The material is characterized by evolutionary equations for multiplication

## MAJOR DISASTER TYPES

3.008,

exhibit respectively a Bauschinger effect, isotropic hardening and isotropic softening when subjected to a program of alternating strains at constant rate.

Pub. Sep. 73: 22p., NTIS No. PB-226 024/8; PC \$3.50 MF \$1.45.

SUPPORTED BY University of California

### 3.0082, INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES

H. KRAWINKLER, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** A thorough experimental investigation of a column with two beams framing into it, was carried out. The selection of a model suitable for laboratory testing is discussed, and a description of the experimental setup and the testing procedure is presented. The experimental data obtained include the section properties, loading histories, comprehensive tables of all load and deformation parameters, load-deformation. Hysteresis diagrams, deformation fields and strain (stress) distributions in the connection areas. A detailed interpretation of the test results is presented, including an evaluation of the significance of the most important geometrical and loading parameters with respect to strength, stiffness and ductility. The effect of these parameters on the energy absorption capacity and energy dissipation is studied.

Pub. Oct. 71: 306p., NTIS No. PB-211 335; PC \$6.00 MF \$0.95.

SUPPORTED BY University of California

### 3.0083, INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE

J. LYSMER, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Specifically the investigation involved a study of the effect of the deformability of the rock underlying nine different soil deposits, ranging in thickness from 50 to 300 ft, on the acceleration amplitude and frequency characteristics of the motions developed in the rock and at the surface of the deposits.

Pub. Nov. 70: 35 p., NTIS No. PB-197 897; PC \$3.00 MF \$0.95.

SUPPORTED BY University of California

### 3.0084, RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS

S.A. MAHIN, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** The effect of high loading rates on the behavior of reinforced concrete structures and the effectiveness of the epoxy-injection technique of repairing cracks in such structures have been studied through tests on six simply-supported, doubly-reinforced, concrete beams. Zones of time-varying moment were developed in the specimens by imposing the same displacement histories at the third points of the

Pub. Dec. 72: 160p., NTIS No. PB-224 520/7; PC \$10.00 MF \$1.45.

SUPPORTED BY University of California

### 3.0085, ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS

I. MINAMI, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

**Abstract:** Effects of plastic soil deformation on the earthquake response of buildings using elastic-plastic finite element models are presented. Non-uniform support excitations were generated statistically to reflect the soil-layer formation of downtown Tokyo. The lumped mass model of the building is attached through a massless rigid mat to the soil which is represented by a set of finite elements arranged in three rows, representing two typical soil layers of downtown Tokyo. Numerical results of elastic-plastic analyses for 3, 9 and 18 story buildings with and without basements were compared with those of the corresponding elastic systems as well as buildings with the base fixed at the ground level.

Pub. Aug. 72: 164p., NTIS No. PB-214 868/2; PC \$6.00 MF \$0.95.

SUPPORTED BY University of California

### 3.0086, INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES

PENZIEN, Univ. of California, School of Engineering, Berkeley, California 94720 (021001)(TRAIS)

Existing bridge design methodology for providing seismic resistance will be evaluated. A more rational approach will be developed and recommendations made for correcting any deficiencies found in existing specifications.

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SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

### 3.0087, THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS

J. PENZIEN, Univ. of California, School of Engineering, Berkeley, California 94720

The objective of the research is to establish three-dimensional stochastic models of strong earthquake ground motions which include the effects of local soil conditions, magnitude, epicentral distance, and depth of focus. These models are nonstationary in character and possess statistical properties which are consistent with those of real earthquakes.

The properties are being established through statistical analyses of strong ground motion data. Covariance and cross-correlation functions are being generated for the individual and component pairs, respectively, of recorded ground motion accelerations. The random characteristics of magnitude and direction of the time dependent resultant acceleration vector are being examined with respect to soil conditions, etc.



Abstract: Reinforced concrete cantilever beams discussed were 15 in. by 29 in. in cross-section. All had six No. 9 deformed bars for longitudinal reinforcement at the top and bottom. The shear reinforcement differed in size and spacing for each specimen. With heavy longitudinal reinforcement and small cantilever length (78 in.), high shearing forces were transmitted simultaneously with the bending moments. The objective was to study the effects of the high shear forces on deformation, strength, stiffness and energy dissipation capacity of flexural members.

Pub. Oct. 72: 90p., NTIS No. PB-214 555/5. PC \$3.00 MF \$0.95

SUPPORTED BY: University of California

### 3.0089, CYCLIC LOADING OF FULL-SIZE CONNECTIONS

*J. P. POPOV*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

Abstract: A series of eight tests of large full-size steel beam-to-column connections subjected to cyclic loading simulating earthquake effects on a building frame have been performed. All beams were made of A36 steel. The connections of the beam to column stubs were either of the all welded type, or of welded flanges and bolted web types. The principal objective of the work was to determine the behavior of these two types of connections under severe cyclic loading well into the inelastic range and to assess the difference in their performance. All connections showed strengths in excess of capacities determined by the simple plastic theory, i.e., without regard to strain hardening. The hysteresis loops in all cases were remarkably stable in shape under repeated loading cycles. All-welded connections showed excellent ductility. The bolted web-welded flange type connections also behaved well, but were less ductile.

Pub. Dec. 70: 62p., NTIS No. PB-213 545/9. PC \$5.25 MF \$0.95

SUPPORTED BY: University of California

### 3.0090, OPTIMUM DESIGN OF EARTHQUAKE-RESISTANT SHEAR BUILDINGS

*D. RAY*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

Abstract: The report is the first of a series of studies concerned with identification and simulation of the response of multistory framed buildings as a function of design variables and earthquake ground motion. A methodology is developed via optimization theory, in which concepts of objective function, behavioral constraints and system dynamics are given a mathematical structure upon which optimal synthetic design, application to one-bay, multistory, unbraced frames is discussed to illustrate the methodology. Minimum volume of column sections is taken as the objective, along with the constraint that the structure should respond elastically with limited relative story drifts under moderate earthquakes. System dynamics appropriate to a shear-type building frame is adopted along with ground motion characterized by standard pseudo-velocity response spectra.

Pub. Jan. 74: 102p., NTIS No. PB-231 172/8. PC \$4.50 MF \$1.45

SUPPORTED BY: U.S. Natl. Science Foundation

### 3.0091, DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING

*D. REA*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

Abstract: The dynamic behavior of a high-rise building is studied in its first two torsional modes by means of eccentrically type vibration generators. A mathematical model of the building for E-W translational motion was formulated from the structural drawings. Various parameters in the model were adjusted until resonant frequencies and mode shapes matched the corresponding experimental values. One of the significant conclusions of the study was that in order to match the mode shapes accurately, the effects of the walls, the central core, and foundation compliance had to be included. The final phase of the investigation was the determination of the response of the mathematical model to various amounts of damping up to 5% of critical) to the Centro (1940) earthquake ground acceleration.

Pub. Aug. 71: 107p., NTIS No. PB-203 584. PC \$3.50 MF \$0.95

SUPPORTED BY: University of California

### 3.0092, ACCELERATIONS IN ROCK DURING EARTHQUAKES IN THE WESTERN UNITED STATES

*P.B. SCHNABEL*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

Abstract: Maximum accelerations records on rock sites during earthquakes in the Western part of the United States are summarized, and attenuation curves showing the decrease in maximum acceleration with increasing distance from the zone of energy release are developed for different magnitudes of earthquakes. Changes in acceleration level and predicted periods of rock motions with distance are also analyzed. The significance of maximum acceleration level as an indicator of intensity of ground shaking is discussed.

Pub. Jul. 72: 33p., NTIS No. PB-211 100/1. PC \$3.00 MF \$0.95

SUPPORTED BY: University of California

### 3.0093, MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS

*P.B. SCHNABEL*, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720

Abstract: A procedure for modifying the time history of seismic records for the effect of local soil conditions is presented. The method is based on a conventional one-dimensional wave-propagation approach with equivalent linear soil properties extended to practical use for three dimensions through the Fast Fourier technique. The validity of the approach is tested against the motions recorded on soil sites and one rock site during the 1957 San Francisco earthquake. The good agreement between the computed and recorded values indicates that rock motions can be computed from motions recorded on soil deposits, and that the computed rock motions in turn can be used to predict the motions that would have been recorded under different soil conditions. The method is also used to compute the probable rock motions in the vicinity of El Centro during the earthquake of 1940 and the ground surface motions that could have been developed on various soil conditions in the same general area.

Pub. Dec. 71: 33p., NTIS No. PB-214 450/9. PC \$0.50 MF \$0.95

SUPPORTED BY: University of California

### 3.0094, EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA

*H.B. SEED, Univ. of California, Inst. of Trans. & Traf. Engin., Berkeley, California 94720*

Investigation was initiated in order to develop a better understanding of the regional distribution of shaking intensities, during earthquakes. Methods of assessing the response of soil deposits have been developed and used to analyze the ground motions recorded during earthquakes in San Francisco (1967), Mexico City (1962), Anchorage, Alaska (1964), Osaka, Japan (1964) and Tokyo, Japan (1963). The analytical techniques have advanced to the point where they are being incorporated in design studies of significant structures.

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SUPPORTED BY No Formal Support Reported

**3.0095, ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971**

*H.B. SEED, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720*

Abstract: The conditions leading to the slides in the San Fernando Dams during the earthquake of Feb. 9, 1971 are described, together with the results of detailed field and laboratory studies conducted to determine the properties of the construction materials and the causes of the slides. The mechanism of sliding in the Lower Dam is reconstructed and it is shown that failure of the upstream slope resulted from a loss of strength in the soils near the base of the embankment. The results of dynamic analyses of the dams are presented and shown to be in reasonable accord with the observed performance.

Pub. Jun. 73: 314p., NTIS No. PB-223 402/9: PC \$17.75 MF \$1.45.

SUPPORTED BY University of California

**3.0096, SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES**

*H.B. SEED, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720*

Abstract: The report summarizes the available data concerning the shear moduli and damping ratios for soils. Clearly more data on these dynamic characteristics is required, particularly for silts, clays and gravelly soils. However it is hoped that the data presented will serve as a useful guide in the selection of soil properties for dynamic response analyses and that other engineers might be encouraged to make available any additional data which would supplement that presented above.

Pub. Dec. 70: 45p., NTIS No. PB-197 869: PC \$3.00 MF \$0.95.

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**3.0097, A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL**

*H.B. SEED, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720*

Abstract: Catastrophic failures in recent earthquakes have provided a sobering reminder that liquefaction of sandy soils as a result of earthquake ground shaking poses a major threat to the safety of civil engineering structures. Major landslides, lateral movements of bridge supports, settling and tilting of buildings, and failure of waterfront retaining structures have all been observed in recent years as a result of this phenomenon. Efforts to better understand and predict the

liquefaction potential and to compare the results of the method with a number of cases in which liquefaction is known either to have occurred or not occurred in the past. Pub. Nov. 70: 43p., NTIS No. PB-198 009: PC \$0.95.

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**3.0098, ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTISPAN HIGHWAY BRIDGES**

*W. TSENG, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720*

Abstract: Descriptions are given to the analytical investigation of the seismic response of long, multiple-span highway bridge structures of the type which suffered heavy damage during the San Fernando earthquake of February 9, 1971. Linear and nonlinear mathematical modelling of the bridge structural system is presented. A three-dimensional elasto-plastic flexural column model suitable for the coupled inelastic behavior of reinforced concrete columns is described in detail. A nonlinear beam model for simulating the nonlinear discontinuous behavior of bridge expansion joints is also presented. Then, a comparison of linear and nonlinear analytical procedures are described for determining the seismic response of this type of bridge structure.

Pub. Jun. 73: 223p., NTIS No. PB-227 816/6: PC \$1.45.

SUPPORTED BY University of California

**3.0099, STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS**

*E.L. WILSON, Univ. of California, Earthquake Engin. Res. Ctr., Berkeley, California 94720*

Abstract: A procedure and a computer program are described for the linear structural analysis of frame and shear wall buildings subjected to both static and earthquake loads. The building is idealized by a system of independent beam and shear wall elements interconnected by floor diaphragms which are rigid in their own plane. Within each element, bending, axial and shearing deformations are considered. Beams and girders may be nonprismatic and beams may have shearing deformations included. Also, shear walls may be considered. Finite column and beam widths are included in the formulation. Nonsymmetric, nonrectangular buildings which have frames and shear walls located arbitrarily can be considered.

Pub. May 72: 94p., NTIS No. PB-212 904/7: PC \$0.95.

SUPPORTED BY University of California

**3.0100, RECONNAISSANCE STUDY OF RECENT GEOTHERMAL GROUND WATER**

*L.C. DUTCHER, U.S. Dept. of the Interior, Geological Survey, Garden Grove, California 92643*

Imperial Valley, California is a geothermal area with potential for developing energy for power, desalination and space heating. Shallow and deep wells in the 2,500 sq. mile area indicate greater than normal temperature. Geothermal development is in the Buttes Field at the Salton Sea and at Cerro Prieto, 55 miles south of Mexicali, Mexico. Exploratory drilling by the Bureau of Reclamation and the U.S. Geological Survey is continuing.

The purpose of the study is to estimate the total amount of water in storage, and the amount of total recoverable water in storage in the sedimentary basin with salinity equal to or less than that of sea water (35,000 mg/l). A principal use of the information will be to estimate the magnitude of the local geothermal energy resource. Meeting these objectives will require developing a conceptual model of the geohydrology of the cold, warm and hot flow systems in the basin, and may necessitate future studies.

Collection for analysis and study of pertinent available geological, geophysical, and hydrologic data, including well logs. Formulation of a conceptual model of the sedimentary basin. Estimate water in storage, recoverable and nonrecoverable, of sea water or better quality. Describe possible hazards which might accompany water production, including land subsidence, seismic activity. Appraise and develop future work programs. A report will be prepared.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0101, RECOMMENDATIONS DEVELOPED FROM REPORTS OF THE EARTHQUAKE COMMISSION AND EARTHQUAKE TASK FORCES - SAN FERNANDO EARTHQUAKE (ABBREV)

LANNOBN, Los Angeles Co. Bd. of Supvrs., Los Angeles, California

After the San Fernando earthquake of February 9, 1971, the Los Angeles County Board of supervisors promptly appointed a seven-member Earthquake Commission comprised of leaders in the fields of engineering, seismology and construction. They were asked to examine the effects of the earthquake, assemble facts, draw conclusions and make recommendations for corrective actions to be taken in anticipation of future earthquakes. In its 1971 report, the County Earthquake Commission made broad recommendations in 15 identified areas of multi-jurisdictional concern.

Six wide representative Task Forces, with County department heads as chairmen, were then appointed to study solutions and submit specific recommendations on what must be done and how. This report outlines primarily the County's actions and progress in implementing the various Earthquake Task Force recommendations.

Pub. June 73. 43p. No copy info available.

Abstract provided by FDAA

SUPPORTED BY No Formal Support Reported

### 3.0102, OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK

CM DUKE, Univ. of California, School of Engineering, Los Angeles, California 90024

An interdisciplinary effort is being made to develop and validate a methodology for incorporating seismic hazard into the decision making process in the planning and design of water resource systems. Knowledge from the fields of earthquake engineering, water resource engineering and systems engineering is applied. The earthquake forces from violent shaking and surface fault displacement are considered. Cost functions are being developed for various water system elements in terms of the intensity of shaking and the amount of fault movement, as well as in terms of repairing seismic damage. The intensity of shaking is expressed in the form of probability maps. The basic system analysis tool of the methodology is semi-Markov decision processes. The

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### 3.0103, SOIL LIQUEFACTION DURING EARTHQUAKES

K.L. LEE, Univ. of California, School of Engineering, California 90024

The objective is to obtain further information on soil behavior under cyclic loading which more closely estimates the stresses induced in soil elements in the earthquakes and thus reduce the number of approximations and uncertainties involved in seismic stability analyses of structures. Two separate cyclic loading effects are being studied for study which go beyond the current practice: (1) application of a more realistic train of irregular cyclic loading than the customary practice of using 'equivalent' stress waves; and (2) application of cyclic stress in multiple directions instead of the current practice of uniaxial, or plane strain cyclic loading.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0104, MICROEARTHQUAKE MONITORING IN THE ANGELES AREA

T. TENG, Univ. of Southern California, School of Engineering, Los Angeles, California 90007 (14-08-0001-12290)

To conduct a microseismicity study of the Baldwin Hills of the Newport-Inglewood fault in the metropolitan Los Angeles area in order to evaluate the potential seismic hazards and determine relative importance of seismically observable strain due to the influence of oil field subsidence and natural tectonic processes.

Seismic stations are being installed in the vicinity of the Baldwin Hills. Data from these stations is telemetered to a central recording and analysis take place. Seismic events are located and compared with patterns of fluid injection in the Inglewood oil field.

Supporting agency address information: Defense Research Projects Agency, Arlington, VA. 22209

SUPPORTED BY U.S. Dept. of Defense - D.A.R.

### 3.0105, RELATIVE ACTIVITY OF MULTIPLE ACTIVE STRANDS - CALIFORNIA

M.G. BONILLA, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The objective is to obtain data on the detailed geologic time sequence of recent movements on adjacent active strands of active faults. Data will be sought to: (1) the width affected by the principal rupture and branch ruptures, (2) the relative rate of displacement on the strands, and (3) the shift or persistence of activity on the strands.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0106, SANTA CRUZ COUNTY COOPERATIVE STUDY

E.E. BRABB, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

This study is undertaken to provide basic data necessary for preparation of the Seismic Safety Element of the Santa Cruz County General Plan. Since sufficient data is presently available regarding flood plains and areas susceptible to seismic waves, it is the purpose of this study to provide information regarding seismic hazard.

## MAJOR DISASTER TYPES

broad evaluations of consultant reports in support of development projects. Additionally, the geologic information provided by the study will help in identifying or anticipating fault and landslide problems, and will thus indicate where special needs exist for further and more detailed investigations.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### 3.0107, EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION

**E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California

Identify, characterize and map the earthquake geologic hazards of the San Francisco Bay region. Develop criteria for recognition of geologic materials subject to landsliding, liquefaction and other ground failures resulting from earthquakes and refine techniques of estimating ground response to earthquakes for different geologic settings and seismic base motions. Prepare an active earthquake data system to compute local seismicity, ground base motion, natural period and amplification spectrum for ground materials, as well as probabilities of liquefaction, compaction, lateral spreading, landsliding and surface displacement along faults. This data system would provide the ability to quickly prepare and update regional or local seismic risk maps for planners and others concerned with earthquake hazards in the Bay region.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### 3.0108, REGIONAL GEOLOGICAL FRAMEWORK, NORTH CENTRAL SAN ANDREAS FAULT - CALIFORNIA

**E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

Determine the regional geology along the San Andreas fault at a scale of 1:125,000.

Provide geologic framework for San Andreas Fault System at mapping scales commensurate with needs for topical geological studies, geophysical investigations, and seismological studies: 1. Regional tectonic framework of entire San Andreas fault zone at scale 1:125,000. 2. Three-dimensional geologic transects across San Andreas fault zone at 1:62,500 and 1:24,000. 3. Prepare maps showing trace of major faults; e.g., 1906, 1857, 1941. 4. Prepare maps showing width of San Andreas fault zone. 5. Detailed mapping in sites selected for geophysical instrumentation.

Project area is from San Francisco to Hollister and from the Pacific Ocean to the Diablo Range.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### 3.0109, ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA

**E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The interpretation of earth science data for land-use planning. Emphasizes earthquake hazard reduction, coastal erosion, slope stability, and engineering properties of hillside and flat-land materials.

This project involves measurement of fault slip in tectonic creep or otherwise, and other related problems including near-field strain response during both large failure intervals. Interpretation of results and the investigations related to fault creep are also within the project. The objectives of the research are to determine tectonic processes within the fault zones, to develop theories concerning the mechanics of such processes, seek evidence of fault zone activity that might be useful for earthquake prediction or for modification of behavior.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### 3.0111, SAN ANDREAS FAULT - CALIFORNIA

**M.M. CLARK**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

The purpose of this project is to produce strip maps of 1:24,000 or smaller that will show the location and briefly describe the most recently active trace of the San Andreas fault in California, other than the San Andreas, that are probably active. The map of the Garlock fault is intended for completion in 1973. Work on the San Andreas fault southeast of the San Andreas Pass and on the complex fault system of the eastern Sierra Nevada will extend into 1973 or later, depending on the results of other investigations. Other active faults in California will be mapped in succeeding years.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### 3.0112, SOUTHERN CALIFORNIA TECTONICS

**M.M. CLARK**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

This project attempts to characterize the surface geologic history of the southern San Andreas fault, Sierra Nevada, Elsinore, and parts of the San Gabriel faults. The products are 1) strip maps at 1:24,000 showing the most recently active traces of these faults, and 2) detailed studies of the late Pleistocene and Holocene history of movement as shown in stratigraphy, structural geology, and geomorphology. The map of the Garlock fault is intended for completion in 1974. Work on the San Andreas fault southeast of the San Andreas Pass and on the complex fault system of the eastern Sierra Nevada will extend into 1974 or later, depending on the results of other investigations. Other active faults in California will be mapped in succeeding years.

Detailed studies of specific parts of the San Andreas fault and Sierra Nevada fault systems are planned to determine late Pleistocene and Holocene history of movement along these faults.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### 3.0113, REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF EARTHQUAKE ACTIVITY, MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (ABBREVIATED)

**M.M. CLARK**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

tonic activity in the fault zone and (5) investigate the relation of the fault to intricate folding in adjacent strata. Field work is complete for the resulting contributions to the Professional Paper about the earthquake.

However, parts of the fault continue to move, leading to enlargement of the 1968 breaks and creation of new breaks. Furthermore, surficial processes have not yet entirely erased individual ruptures in the areas in which creep appears to have ceased. Thus periodic field investigations along the fault will continue as long as the surface traces display significant and measurable changes.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0114, EARTHQUAKE MODELING

J.H. DIETERICH, U.S. Dept. of the Interior, Geological Survey, *Mento Park, California 94025*

The overall goal this project has is to study the mechanical interactions associated with faulting and related earthquake source mechanics. The approach that is being followed attempts to determine the various interrelations between material parameters, small scale (laboratory) mechanical processes, earthquake source characteristics and long-term strains in the vicinity of shallow faults. Work thus far accomplished has employed one-, two-, and three-dimensional numerical models that simulate the quasistatic and dynamic motions of earthquake sequences. Topics that have been examined with these models include triggering of earthquakes by fluid injection, near-field ground motions, modeling of aftershocks, scaling laws for source parameters, relationship between source parameters and fault friction parameters, and dilatancy.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0115, EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA

J.H. DIETERICH, U.S. Dept. of the Interior, Geological Survey, *Mento Park, California 94025*

Studies of earthquakes related to fluid injection at Rangely, Colorado, and elsewhere have shown that the effective stress law for shear failure of rocks is applicable on a large scale. Numerical modeling indicates that it is at least theoretically possible to control earthquakes by limiting the maximum length of the rupture surface through proper control of fluid pressures on the fault. The purpose of this experiment is to study the problem in detail by conducting tests on artificial faults in large blocks about 26 feet long in a quarry at Cold Springs, Minnesota. A rectangular block of granite will be separated from the surrounding rock and loaded along its boundaries by large hydraulic flatjacks. Stresses to 300 bars on the fault surface can be obtained by this method. Length of the fault rupture will be controlled by fluid injection. Displacements, velocities, and accelerations at the fault and in the near field will be measured during the slip events. In addition, evidence for precursory velocity changes and resistivity changes will be sought.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0116, MONTEREY BAY - CALIFORNIA

H.G. GREENE, U.S. Dept. of the Interior, Geological Survey, *Mento Park, California 94025*

The Monterey Bay project is concerned with the geophysical and geological mapping of Monterey Bay, Monterey Canyon

profiling with a high resolution, .6 to 1 kj sparker, intermediate penetration, 13 to 33 kj sparker, high powered, 160 kj sparker, magnetic profiling with a marine proton precession magnetometer, and gravity profiling with a shipborne stable platform marine gravimeter, is being done presently. Interpretation of the geological data which consist of bedrock and sediment samples collected by dredging, gravity coring, vibracoring, and in situ sampling with a research submersible are continuing.

Principal objectives of this project are (1) to seismically map the geologic structures of Monterey Bay, to establish geology of the bay, its structure and tectonic history; genesis, thickness and depositional history of the sediments of the bay, (2) to determine the distribution and locations of fresh water aquifers in the northern portion of the bay, (3) to determine the origin of Monterey Submarine Canyon and its significance as it relates to the geology of the bay, (4) to map faults in Monterey Bay and along the shelf from Point Sur to Ano Nuevo Point and determine their significance as they relate to onshore geology, recent seismic events, and modern day working hypothesis such as sea-floor spreading, and (5) to delineate geologic hazards such as locations of slumps and possible submarine landslides. Areas of possible economical interests, such as sedimentary structures that may contain hydrocarbons and locations of possible commercially available sand and gravel deposits have been identified.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0117, INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA

M.J. JOHNSTON, U.S. Dept. of the Interior, Geological Survey, *Mento Park, California 94025*

The instrumental strain project is aimed primarily at determining the near-field modes of strain accumulation and release associated with earthquakes on active faults in the western United States. We believe this to be a necessary prerequisite for understanding and predicting earthquakes. The instruments used at present include: (1) ten tiltmeters, three strainmeters, and eight magnetometers installed along 80 km of the most active section of the San Andreas, (2) Portable differential magnetometers used at 106 sites along more than 1,000 km of the major faults in California and Nevada.

Unless major problems are encountered, these instruments should be increased to 15 tiltmeters, 6 strainmeters, and 10 magnetometers by next summer. Several new techniques are under development which should increase further our ability to obtain easily, basic information on the earth's crust in seismically active areas.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0118, ENGINEERING SEISMOLOGY - CALIFORNIA

W.B. JOYNER, U.S. Dept. of the Interior, Geological Survey, *Mento Park, California 94025*

States to which project pertains: Current work is concentrated in California but project results will be applicable to all seismically active areas.

The goal of the Ground Motion studies project is to develop reliable methods for predicting the amplitude and other characteristics of earthquake ground motion and how those characteristics vary in different geologic environments. Current work is concentrated on studying the amplification of ground motion by near-surface, unconsolidated materials. Work un-

bedrock input motions and how they depend on geologic conditions, and (3) seismic field experiments to measure the parameters needed for extrapolating the results of small motion recording into the strong-motion range.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0119, MICROEARTHQUAKE DATA ANALYSIS

W. H. LEE, U.S. Dept. of the Interior, Geological Survey, *Menlo Park, California* 94025

In this project we develop methods and techniques for processing and analyzing seismic data recorded by microearthquake network of seismograph stations. Results from this project are accurate locations of earthquakes, their magnitudes and focal mechanisms. We can then relate these results to geologic features of the region under study to map out the active faults in details. In addition, we can study seismic precursory phenomena useful for earthquake prediction.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0120, MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA

D. S. MCCULLOCH, U.S. Dept. of the Interior, Geological Survey, *Menlo Park, California* 94025

The structure of the continental margin between Monterey Bay on the south and Point Reyes on the north is dominated by a northwest-trending belt of rocks composed of continental crust (Silurian block) that is separated from oceanic crust on the east by the active San Andreas fault system, and on the west by the Sur-Nacimiento fault. Recent marine investigation has shown extensive faulting within this crustal block - some of which has offset Holocene deposits. First motion studies of earthquakes that lie on the newly delineated faults within the block indicate right lateral strike slip displacement similar to the adjacent San Andreas fault. Onshore geologic investigation has shown additional evidence for recent faulting, and a long history of continuous deformation of elevated Holocene marine terraces.

The cities of Monterey and Santa Cruz lie adjacent to the coast, and the proximity to the heavily populated areas of the San Francisco peninsula has started to create considerable development pressure along the coast - new port facilities, atomic power plants, residential areas. This program is designed to use geophysical and bottom sampling techniques to establish the fault history of the area, which can then be used as the basis for predicting the seismic hazard in this area.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0121, PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA

E. H. PAMPEYAN, U.S. Dept. of the Interior, Geological Survey, *Menlo Park, California* 94025

States to which project pertains: California.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0122, ALASKA GEOLOGIC EARTHQUAKE HAZARDS

G. PLAFKER, U.S. Dept. of the Interior, Geological Survey, *Menlo Park, California* 94025

States to which project pertains: Alaska.

The specific project objectives are to reduce and evaluate risk in Alaska from tectonic displacement, seismic shaking, and secondary geologic effects. A more general goal is to gain an insight into tectonic processes within the seismically active zone of southern Alaska.

Initially, research efforts will be concentrated in the highly seismic southern part of the State where most of the population and economic development are concentrated. This research will later be extended into the southeastern and central parts of the State. Geological research under this project will be closely coordinated with parallel geophysical projects by the Office of Earthquake Research.

The geologic studies will involve: 1) preparation of detailed maps of active surface faults and evaluation of geologic evidence for late Cenozoic fault movement; 2) delineation of coastal areas that may be subjected to major earthquakes characterized by large-scale regional tectonic elevation changes and assessment of the hazards related to such movements (notably seismic shaking, tsunamis, seiches, and regional warping); 3) identification and evaluation of secondary geologic hazards related to seismic shaking in critical areas of high population density and along transportation routes (such as landsliding, submarine sliding, liquefaction, landspreading and compaction); and 4) preparation (with OERCS) of a synthesis of pertinent data on the tectonic processes in the seismically active junction between the transform fault system in southeastern Alaska and the northeastern extension of the Aleutian arc tectonic regime into south-central Alaska, to provide a broad framework within which earthquake hazards in southern Alaska can be evaluated.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0123, RANGELEY - CALIFORNIA

C. B. RALEIGH, U.S. Dept. of the Interior, Geological Survey, *Menlo Park, California* 94025

The project was designed to test the hypothesis relating fluid pressures to earthquakes. The project involves precise determination of the location and frequency of earthquakes in the oil field. Fluid pressures are well determined through direct measurement and computer simulation of the reservoir history. The hypothesis relates fluid pressure and the state of stress in the rock to failure strength of the rock. Measurements of the state of stress are therefore being carried out. The purpose of the project is two-fold: 1) to determine whether modification of earthquakes on active faults is possible and the best way to accomplish this, and 2) to prevent the inadvertent triggering of earthquakes by subsurface fluid injection.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0124. REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA

S.L. ROBBINS, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The main objective is to use gravity as a tool to aid in the geologic interpretation in tectonically active areas. This includes: 1) Calculations of depths to basement in alluviated areas, particularly in or near urban developments, 2) Detailed studies across faults in an attempt to trace them beyond their presently known locations, and 3) to uncover other structural features that are presently unknown.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0125. SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS

J.C. ROLLER, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

This project is part of a larger program of research which is directed to the study of earthquakes related to fluid injection or reservoir loading. The current phase of the project is primarily data gathering to establish the background seismicity in areas where future injection of fluid in wells and new reservoirs are planned. The project at present consists of recording earthquake activity from two small seismic networks near Tuscaloosa, Alabama and near Childress, Texas where all injection wells have been drilled and fluid injection will begin in the near future. Future work will investigate the level of seismicity associated with fluid injection.

Hopefully the results of this project as well as results from other reservoir studies will be used to help clarify the relationship between fluid pressure and earthquakes. These results would then be directed towards the goal of prevention of inadvertent triggering of earthquakes by fluid injection or reservoir filling.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0126. STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA

J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The project involves measurement of the deformation of the surface of the earth in the neighborhood of an active fault. Attention is concentrated on measuring fault creep by alignment arrays and creep meters, long-range deformation by geodimeter survey of trilateration networks centered on or near the fault, and surface tilt at several sites near the fault. The objectives of the research are to measure elastic strain accumulation (and hence earthquake risk) and to seek indications of premonitory deformation which might be useful for earthquake prediction.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0127. CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO

J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

This project involves measurement of crustal deformation in the neighborhood of active faults using precise geodetic techniques (e.g., geodimeter surveys for horizontal deformation and level surveys for vertical movement). The objectives of the research are to measure slip and elastic strain accumulation along faults and to seek premonitory deformation

### NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON

P.D. SNAPE, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: Washington.

Project involves geologic mapping (scale 1:48,000) and stratigraphic, structural, and petrologic studies of the Cape Flattery area, northwestern Olympic Peninsula, Washington, and reconnaissance geologic studies of selected coastal areas in western Washington. These studies are designed to unravel the geologic history of the Tertiary eugeosyncline. The Cape Flattery area consists of two areas of Tertiary rocks which have undergone different styles of deformation. In the north half of area approximately 6,000 meters of deep-water marine sedimentary rocks of Eocene and Oligocene age overlie submarine basalts of the lower to middle Eocene Crescent Formation. The marine strata dip gently to steeply northward, are broadly folded, and in places are cut by thrust faults. A major thrust fault at the base of the Crescent Formation separates this sequence from highly deformed deep-water marine sedimentary and volcanic rocks of Eocene age that form part of the core of the Olympic Peninsula. Faults with large displacement juxtapose formations of different ages as well as coeval rocks with different provenances; rocks with melange-like aspects are associated with the large thrust faults. The mineral resources potential, geologic hazards, and land-use problems will be evaluated and the studies will provide the onland geologic framework needed to interpret the geology of the adjacent continental margin and the Strait of Juan de Fuca.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0129. AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA

S.W. STEWART, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The National Center for Earthquake Research systematically analyzes the earthquake recordings obtained from a network of more than 100 seismic telemetry stations located along the San Andreas Fault system in California. Both the systematic processing of these telemetry data, and the operation of a viable system for earthquake prediction or control, require detailed analysis of the seismic activity within a few hours, and perhaps minutes, of its occurrence. The goal of this project is to provide a system capable of rapid and detailed analysis of earthquakes occurring within the NCER seismic telemetry network in California.

At present two special-purpose digital computers are used to develop and implement real-time and off-line methods of earthquake data acquisition and processing. Real-time monitoring on a part-time basis of a 30 station subset of the larger San Andreas seismic telemetry network was carried out for six months in 1972. This experiment demonstrated the practical feasibility of long-term monitoring in real-time by a computer. A dedicated special-purpose computer system is used now to monitor all 97 vertical component seismometers within the NCER San Andreas seismic telemetry network. P-phase onset times, amplitudes and other parameters are output to appropriate media within 1-2 minutes of the occurrence of an earthquake within the network. Epicenters and magnitudes are calculated off-line.

tion system. The two special-purpose computers presently in use by NCER will form the core of these data acquisition and analysis systems. Investigation into the design of these systems is now underway.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0130, SEISMIC SOURCE STUDIES - CALIFORNIA

W. THATCHER, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

Analysis and interpretation of geodetic measurements made along the San Andreas fault zone in California have provided considerable information on the modes of strain accumulation and release in this region. In particular, these studies have revealed that significant aseismic slip occurred on the fault beneath the seismic zone in the years following the 1906 San Francisco earthquake. In central California, along the area of steady surface creep, geodetic data are sufficient to uniquely determine the average slip rate below 15 km on the fault within relatively small uncertainties, the estimate being 4.0 plus or minus 0.7 cm/yr.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0131, TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA

R. VONHUENE, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

Currently drill data from Leg 18 of the GLOMAR CHALLENGER are being analyzed and prepared for publication as has been done with each past summer's field work. The anticipated objective of this project, to synthesize the regional tectonic scheme of the Gulf of Alaska continental margin, cannot be accomplished without additional geophysical field work. The objective is directed into two areas: (1) Earthquake hazard evaluation, including an understanding of the 1964 earthquake and an assessment of what is now considered the most likely site for a future great Alaskan earthquake, (2) develop an understanding of the regional tectonic framework so that the large, potentially petroliferous geologic structures of the continental shelf can be more accurately evaluated as to their resource potential.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0132, ACTIVE FAULTS AND GEOLOGIC HAZARDS, PE. MUGU TO WILMINGTON, CALIFORNIA

H.C. WAGNER, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertain: California.

Topical studies related to earthquake hazards in the southern California borderland, with geologic mapping and resource evaluation spinoff. Major objective of project is to reconstruct the depositional and structural setting of the area in order to determine the age and kinds of faulting along offshore faults as a means of evaluating their potential for earthquakes, tsunamis, landslides, or slump hazards as it relates to building construction or to Man's safety in areas of high population growth. The geologic mapping will fill gaps in knowledge of offshore parts of the southern California borderland and will provide a means of assessing surface and subsurface economic resources (e.g., sand and gravel, phosphate, manganese, oil and gas).

Surface fracture patterns along the San Andreas fault in California will be described and analyzed. Holocene faulting in north central Nevada will be studied with emphasis in 1974 on fault scarp morphology as a key to age and recurrence of movement on faults of this type.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0134, CALIFORNIA MEO NET

R.L. WESSON, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The primary purpose of this project is to gain understanding into the geologic and physical processes of elastic strain accumulation and release along the San Andreas fault system. This understanding will enable us to identify areas of high earthquake hazard and perhaps to predict moderate and large earthquakes.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0135, CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA

R.L. WESSON, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The goals of this project are: 1. To construct, through the collection, analysis and interpretation of seismic data from central California, models of the earthquake generating process enabling the prediction of earthquakes. 2. To identify and delineate active faults in central California, and to find methods of assessing their potential for producing a damaging earthquake, through the analysis and interpretation of seismicity data. 3. To provide timely, routine descriptions, catalogs and computer materials of the locations, depths, origin times and magnitudes of earthquakes in central California, for the use of this project, other Survey projects and outside agencies and researchers.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0136, APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA

J.R. BENJAMIN, Stanford University, School of Engineering, Palo Alto, California 94305

This project will examine the development of a methodology incorporating the principles of statistical decision theory to assist the engineer in rationally designing structures for earthquake loading. The methodology will include the following aspects: phenomenology - development of appropriate probabilistic models for the phenomena based on the available data and postulated levels of design criteria; structural behavior - development of probabilistic models for the structural response to the phenomenal loadings and for relationships between response and postulated levels of structural damage, and; decision theory - selection of appropriate design criteria and corresponding design of the structure by optimization of the damage potential.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0137, APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING

K. HAFEC, Stanford University, School of Engineering, Palo



3.0138.

A specific objective is to study the use of 'partial safety factors' for systems that can fail in any one of several modes. Two examples will be considered (1) the design of an earth retaining structure like an anchored bulkhead, and (2) design of a compacted earth-fill dike in a seismic region. The values of the partial safety factors should reflect the uncertainties in loading, soil properties and in-situ soil stresses, as well as a consideration of the penalty of failure for different failure mechanisms

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0138. STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA

4. NUR, Stanford University, School of Earth Sciences, Palo Alto, California 94305

Our ability to completely understand earthquakes rests on a fundamental problem: what is the mechanism of stress accumulation and release and its spatial distribution on earthquake faults? In the present research it is proposed to examine several aspects pertinent to the San Andreas fault system in central California: seismicity and source mechanism studies, the distribution of fault creep and its relation to tectonic stress; and theoretical studies of the relation between surface slip and deformation and stress changes on faults.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0139. CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES

C.R. ALLEN, Calif. Inst. of Technology, Graduate School, Pasadena, California 91109

Support of California Institute of Technology seismic network and San Fernando earthquake studies will be continued under the grant. Fifteen publications by staff and students have already resulted from the first year's efforts, and several more are nearing completion. Proposed continuing and new studies include (1) continuing studies of aftershock locations and tectonic implications, (2) inversion studies of the static displacement field, (3) source studies of San Fernando aftershocks using broad-band recording on portable seismic units and (4) support of telemetry expenses for the California Institute of Technology southern California seismographic network.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0140. EARTHQUAKES AND INSURANCE - ERA CONFERENCE 2-3 APRIL 1973

J.C. FULTON, Calif. Inst. of Technology, Center for Res. Prev. Disaster, Pasadena, California 91109

The annual conference of the Earthquake Research Affiliates, California Institute of Technology, was held on 2-3 April 1973 on the campus of the California Institute of Technology. Some of the papers presented at the conference dealt

### 3.0141. MODAL COUPLING AND EARTHQUAKE RESPONSE OF TALL BUILDINGS

J.B. HOERNER, Calif. Inst. of Technology, Earthquake Engin. Res. Lab., Pasadena, California 91109

Abstract: The major dynamic features of tall buildings are examined with a shear beam model. The usual one-dimensional model is extended to three dimensions to include modes with translational and rotational components. A class of linear response models for tall buildings is presented having three sets of mutually orthogonal coupled modes. The amount of modal coupling is related to the eccentricities and frequency differences. A perturbation scheme is developed for buildings almost in this class. Rotational components of earthquake response in buildings are related to modal coupling

Pub. May 71: 163P., NTIS No. PB-207 635; PC \$3.00 MF \$0.95.

SUPPORTED BY California Inst. of Technology - Pasadena

### 3.0142. EVALUATION OF THE INCREMENTAL SEISMIC RISK DUE TO RESERVOIR FILLING

G.W. HOUSNER, Calif. Inst. of Technology, School of Engineering, Pasadena, California 91109

The Ad Hoc Committee on Earthquake Effects on Dams will (1) investigate the problems posed by earthquakes concerning the safety of large concrete, earth and rockfill dams, and define the most important problems in need of intensive research, (2) investigate the influence of the reservoirs created by large dams on seismic activity in the local environment, and (3) recommend the procedures necessary to define the investigations and design methods that will mitigate earthquake effects upon dams. This ad hoc committee was formed in March 1973 by the United States Committee on Large Dams (USCLD), the U.S. branch of the International Commission on Large Dams.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0143. THREE-YEAR OPERATION OF THE UNIVERSITIES COUNCIL FOR EARTHQUAKE ENGINEERING RESEARCH

W.D. IVAN, Calif. Inst. of Technology, Graduate School, Pasadena, California 91109

The need for a sound basis on which to make decisions on how civil structure should be designed to reduce earthquake risk has led many academic researchers to enter the field of Earthquake Engineering in recent years. Having recognized the scope of research needs relative to the resources available to support these needs, the several universities active in the field formed the Universities Council for Earthquake Engineering Research (UCER) in 1966. UCER acts as a focus for University researchers to disseminate and coordinate their activities. The objective of this grant is to insure dissemination of earthquake engineering research. This award will supply the financial support necessary for conferences, report production, mailings to members, etc. Two con-

Abstract: The report describes the dynamic properties of a twenty two story office building subjected to simulated earthquake vibration.

Pub. Feb. 71: 99p., NTIS No. PB-205 161: PC \$3.00 MF \$0.95.

SUPPORTED BY California Inst. of Technology - Pasadena

### 3.0145. STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE

P. JUNGELS, Calif. Inst. of Technology, Seismological Laboratory, Pasadena, California 91109

Abstract: The San Fernando Earthquake of February 9, 1971, was well recorded on the quartz seismometer and mercury tiltmeters at Caltech's Isabella station, 147 km north of the epicenter. Strains were recorded also on a laser strain meter at UCSD and 2 strainmeters near the Nevada test site. (respectively 210 and 380 km from the epicenter). The permanent offsets are consistent with the strain release that is inferred from the fault plane solution and surface breakage.

Pub. 1971: 4p., NTIS No. AD-727 403: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Air Force

### 3.0146. PUGET SOUND, WASHINGTON, EARTHQUAKE AND THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES

D. MCKENZIE, Calif. Inst. of Technology, Seismological Laboratory, Pasadena, California 91109

Abstract: A detailed study of the travel time anomalies of the Seattle earthquake supports the existence of a high-velocity slab dipping at 50 degrees E. beneath southwestern Canada and the northwestern United States.

Pub. Jun. 71: 6p., NTIS No. AD-738 409: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Air Force

### 3.0147. A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA

M.D. TRIFUNAC, Calif. Inst. of Technology, School of Engineering, Pasadena, California 91109

A closely-spaced alignment of strong-motion accelerometers will be installed along the San Jacinto-Imperial Fault system of Southern California. The historical rate of magnitude 6 and greater earthquakes on this fault system is that they have occurred at the average rate of one every seven years since 1890; the interval between successive major events has never been more than 14 years. It is anticipated that such an event will occur in the next 3-10 years. It is expected that detailed near-source acceleration records of a major earthquake, whose associated rupture should traverse 3 or more of the instrument localities, will be obtained within the next decade.

This information will considerably expand our knowledge concerning (1) the maximum accelerations associated with moderate to large vertical strike-slip earthquakes in Southern California, (2) the generation of high frequency radiation and estimates of total radiated energy, (3) the propagation velocity of the associated dislocation, (4) the detailed mechanism of the earthquake (smoothly propagating dislocation or a multiple complex event), (5) the distribution of larger aftershocks immediately following the earthquake, and (6) decay of high frequency amplitudes (of both engineering and seismic significance) in the Southern California region.

J.H. WOOD, Calif. Inst. of Technology, Earthquake Engin. Res. Lab., Pasadena, California 91109

Abstract: A study has been made of the earthquake response of the nine-story steel frame Building 180, located at the C.I.T. Jet Propulsion Laboratory, Pasadena, during the San Fernando earthquake of February 9, 1971, which was motivated by the likelihood that an earthquake similar to the February 9, 1971, shock could occur close to the JPL grounds with consequent very strong ground shaking. The analysis throws light on the actual dynamical properties of the building during the earthquake, and demonstrates that it is possible to make accurate calculations of building motions during earthquakes when the ground motion is specified. Periods of the lower modes from pre- and post-earthquake tests are compared with those during the earthquake, and calculations are made of damping ratios, roof accelerations, maximum stresses, and Fourier spectra.

Pub. Oct. 72: 154p., NTIS No. PB-215 823/6: PC \$6.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0149. THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN

D. ARMSTRONG, Tri Cities Seismic Safe. Study, Richmond, California 94806

The Seismic Safety Study for the General Plan is one of three reports issued by the Tri-Cities Study. Pursuant to State Law enacted in 1972, all California cities must include a Seismic Safety Element in their General Plan. This Study is the first major Seismic Safety Study for the General Plan produced in the State and will be distributed as a model to all California cities by the California Council on Intergovernmental Relations. The essential parts of the Seismic Study are: 1) Detailed Findings of the earthquake situation in the Tri-Cities Areas, including geologic and structural factors, present uses and disaster implications, 2) Policies to guide future development and regulate existing development, and 3) Specific recommendations for action by the cities.

Pub. Sept. 73: 199p., Calif. Council on Intergovernmental Relations, Sacramento, Calif. 95816, and NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 3.0150. MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY

K.V. STEINBRUGGE, State Legislature, Sacramento, California 95814

This document is the result of four years of intensive study by the Joint Committee on Seismic Safety, California Legislature, and over 70 technical advisors.

Its recommendations are presented in two sections: first, a comprehensive approach to seismic safety including high-priority legislative proposals; and second, five detailed advisory group reports. These recommendations are supported by a third section of supplementary materials.

Pub. Jun. 74: 223p., No copy Info. available.

3.0152.

The primary objective of the study of the San Fernando earthquake, February 9, 1971, by the Special Subcommittee of the Joint Committee on Seismic Safety is to examine and evaluate the effects of the earthquake and to learn from that earthquake what public policies are needed to minimize injury, loss of life, damage to structures, and disruption of the economy from future potentially damaging earthquakes, not only in the San Fernando area but also in other parts of California.

The Special Subcommittee has been assisted by consultants who are especially qualified in their respective fields of study regarding the earthquake: geologic and seismic factors; dams and soils; structural engineering related to buildings; utilities, communications and transportation facilities; disaster preparedness; land use planning, and government organization and performance. The report prepared on each topic is based on careful analysis and evaluation, in terms of the objectives of the study, of information on the effects the San Fernando earthquake. Some of the information was gathered first hand and some was obtained by other organizations that have studied the earthquake.

Pub. July 72: 132p., No copy info. available.

Abstract provided by FDAA.

SUPPORTED BY California State Government - Sacramento

### 3.0152, ELASTOMERIC ENERGY ABSORBER

*I.F. NORDLIN, State Materials & Res. Dept., Sacramento, California*

Abstract: The report covers testing performed on a proposed elastomeric energy absorbing and restraining unit designed to restrict movement at the hinge openings of reinforced concrete bridge spans when subjected to earthquake forces. Minor modifications were made for each of five tests conducted on a thick walled neoprene tubing contained in extra heavy steel pipe. Load-deflection tests of the restrained neoprene determined the final amount of movement for the forces involved. The results are reported.

Pub. Nov. 71: 21p., NTIS No. PB-207 838: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

### 3.0153, EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA

*J. BERGER, Univ. of California, Graduate School, San Diego, California 92038*

It is proposed to study the long term pattern of strain accumulation, tilt and vertical displacement in southern California for the purpose of relating earth structure and fault tectonics to the occurrence of earthquakes. The temporal and spatial characteristics of the ground motion will be investigated utilizing two established geophysical observatories containing a collection of wide-band instrumentation in conjunction with several movable tiltmeters. Special emphasis will be placed on measurements of earth strain utilizing the 3 component surface laser strain meter now in operation which has established a new low level of instrumental noise, long term stability and freedom from spurious 'strain episodes' and 'steps.' The wide band nature of this instrumentation will facilitate the investigation of the ground motion spectrum

California and their relation to fault tectonics will be studied by examining the effects of ocean tidal loading on the observed earth tides.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0154, ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE

*J.A. BLUME, John A. Blume & Associates, San Francisco, California*

The need for a dynamic-inelastic design code that provides greater utilization of available knowledge than the current earthquake codes is discussed followed by the philosophy of such a code including the requirement for reasonable simplicity and workability. Elements of the code are presented as a supplementary section to existing static-elastic requirements. Two levels of earthquake intensity are specified. The dynamic-inelastic provisions are based upon kinetic energy reconciliation with energy stored, converted to heat, and used to do work in the inelastic range as in the reserve energy technique.

Pub. 1972: 10p., NTIS No. CONF-730 629-A: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0155, MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT

*R.D. NASON, U.S. Dept. of Commerce, Earthquake Mechanism Lab., San Francisco, California*

Abstract: The San Andreas fault is a major earthquake source in California. Its geologic history indicates continuing displacement at about 1.2cm/yr over the past 25 million years which is less than the estimates in current theories of global plate tectonics. Current movement on the fault is by fault displacements in earthquakes and by gradual fault creep slippage not directly related to earthquakes. Fault slippage in the historic period 1848 to 1968 has been equivalent to about 2.5cm/yr average fault displacement.

Pub. 1970: 246-254p., NTIS No. COM-71 00222: Reprint

SUPPORTED BY U.S. Dept. of Commerce - NOAA

### 3.0156, ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLLISTER, CALIFORNIA

*T.H. ROGERS, U.S. Dept. of Commerce, Earthquake Mechanism Lab., San Francisco, California*

Abstract: The Calaveras fault zone, which is a major branch of the San Andreas fault system in northern California, passes through the City of Hollister 160 km (100 miles) southeast of San Francisco. Active fault displacement (fault creep slippage) has occurred in and near Hollister along a fault trace within the Calaveras fault zone. Various man-made structures crossing the fault trace have been deformed and gradually offset in a right-lateral sense. The amount of offset varies directly with the age of the structure. Rates of active fault displacement vary with time and position along the Calaveras and San Andreas fault zones in the Hollister area. The pattern of this variation suggests that active displacement on the San Andreas fault zone may be transferring northeastward to the Calaveras fault zone.

Pub. Apr. 71: 399-416p., NTIS Order No. COM-71 0001 Reprint.

SUPPORTED BY U.S. Dept. of Commerce - NOAA

## MAJOR DISASTER TYPES

3.0163

**Objectives:** The objective of this project is to determine where and how frequently destructive earthquakes ( $M$  equals 5) are likely to occur in the Santa Barbara Channel region. Thus we seek to provide answers to the following more specific questions: 1) Where are the major faults? 2) What have been their geological and historical records of movement? 3) Is strain accumulating across fault zones? 4) Is creep occurring along faults? 5) Where have historic earthquakes occurred here and what have been their effects? 6) Where are earthquakes occurring presently?

**How information will be applied:** Our information on the seismicity, fault locations, and seismic hazards will be of use chiefly to public officials involved in land use planning and public safety. Already our preliminary results on these subjects have been requested formally and informally by local city, county, and university land use planners and safety officials, state and federal geological agencies, individual citizens, local educational institutions, and private industries. In addition, our geodetic studies may result in an earthquake warning system.

**Accomplishments during the past twelve months:** 1. Detection of 4 - 1.3 cm/year vertical movement in the Santa Barbara area. 2. Detection of past earthquake vertical movement following the 1971 San Fernando Earthquake. 3. Analysis of U.S.C. & GS precision level data along the California coastline. 4. Installation of tilt meters along significant faults in the Transverse Range region. 5) Study of effects of 1925 S.B. Earthquake. 6. Fault map of Santa Barbara Channel region. 7. Santa Barbara Earthquake history since 1800. 8. Design and construction of precision tide gauge.

For additional information pertaining to this project contact Dr. George G. Shor, Jr., Scripps Institution of Oceanography, LaJolla, California 92037.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 3.0158, FHA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH-RISE BUILDINGS

**R.W. CLOUGH, T.Y. Lin & Associates, Van Nuys, California**

**Abstract:** The report describes the results of a program of study and research into the earthquake behavior of high-rise buildings. The techniques and standards for the earthquake resistant design of traditional types of buildings are reviewed briefly. A digital computer investigation into the response of various high-rise structural systems was undertaken to extend the understanding of their response to seismic excitation, thus enabling the development of new design criteria which will maintain adequate factors of safety in new types of constructions. An investigation into the structural performance of three buildings in Anchorage during the March 27, 1964 earthquake was carried out. Finally, recommendations for seismic design criteria are specified.

**Pub.** Aug 66: 368p., NTIS No. PB-202 960: PC \$6.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

soil conditions. Strong motion sites are to be geologically evaluated such that data recorded can be fully and reasonably interpreted.

**Progress:** The research plan above has produced results which are being readied for evaluation by seismic design consultants. These results are in the form of highly detailed maps and supporting charts, graphs, tables.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 3.0160, THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT

**S.T. ALGERMISSEN, U.S. Dept. of Commerce, Earth Sciences Laboratories, Boulder, Colorado 80302**

**Abstract:** The risk map currently used by the Uniform Building Code is based primarily on an analysis of seismic intensities recorded during historical time, epicentral locations of damaging earthquakes, and their relationships to important fault systems and tectonic elements. Recommendations are made for short term and long term improvements. The author concludes with the statement that there is real need for further study of the earthquake losses likely to occur in the United States in the next 50 to 100 years.

**Pub.** 1972: 7p., NTIS No. COM-73-10290: Reprint.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 3.0161, A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS

**UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302**

The purpose of the Report is to provide essential data for effective pre-disaster planning for major damaging earthquakes that might affect the San Francisco Metropolitan area.

The study postulates potential maximum credible earthquakes which could occur in the area, and examines the probable effects of such a disaster on the people and critical facilities and life support systems (homes, hospitals, schools and major transportation, communications and public utilities systems).

**Pub.** 1972: 220p., No copy info. available.

**Abstract provided by** FDAA.

**SUPPORTED BY** U.S. Executive Office - O.E.P.

### 3.0162, A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA

**UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302**

The purpose of the Report is to provide essential data for effective pre-disaster planning for major damaging earthquakes that might affect the Los Angeles Metropolitan area.

The study postulates potential maximum credible earthquakes which could occur in the area, and examines the probable effects of such a disaster on the people and critical facilities and life support systems (homes, hospitals, schools and major

3.0164.

A seismic risk map was developed for Utah and Arizona. The map depicts (as contours) the maximum horizontal ground acceleration in a 50-year period. The accelerations mapped have a 10 percent probability of exceedance.

A very accurate hypocenter was determined for the destructive December 23, 1972 Managua, Nicaragua earthquake using an accelerograph record recorded during the earthquake and observed intensities. This accurate location was used to compute station corrections for seismograph stations throughout the world and to recompute the location of the larger earthquakes in the Managua area during the past 50 years.

The long range plans of the project include: (1) Development of theory, analysis of seismic data, and the evaluation of parameters for the preparation of seismic risk maps and associated tables; (2) Evaluation of hazards such as soil liquefaction and land slides; and (3) Investigation of earthquake aftershock activity and intensity distribution associated with damaging or otherwise significant earthquakes.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0164. SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES

W.W. HAYS, U.S. Dept. of the Interior, Geological Survey, Boulder, Colorado 80302

State of the art information required for developing design earthquake response spectra is being compiled in a manual-like format. The objective is to provide by July 1974 to the U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, a rational methodology for estimating the important characteristics of the earthquake ground motion load during construction, design, and evaluation of important military facilities located throughout the United States. The methodology will describe how to perform the following analyses: 1) determination of seismicity parameters, 2) estimation of seismic attenuation functions, 3) estimation of maximum intensity of shaking, 4) estimation of ground motion response spectra, and 5) estimation of local site amplification effects. The manual will have wide application to many earthquake risk analysis projects.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0165. VA. SEISMICITY - 32 STATES AND PUERTO RICO

W.V. MICK, U.S. Dept. of the Interior, Geological Survey, Boulder, Colorado 80302

Provide VA with guidance and consultation concerning adequacy of seismic evaluations submitted by contractors concerning seismicity characteristics in the vicinity of VA hospitals. These results will enable design and structural engineers to build new and reinforce old structures to withstand effects of most likely earthquakes in the area.

This contract work is a part of our mission to evaluate seismic risk. It also makes seismic history data available to the USGS at no additional cost.

There are over 70 hospitals involved in this study in seismic zones 2 and 3.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

Provide data on possible control of seismicity by man and on localized seismic characteristics.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0167. SEISMICITY AND EARTH STRUCTURE

J. TAGGART, U.S. Dept. of the Interior, Geological Survey, Boulder, Colorado 80302

States to which project pertains: Worldwide with emphasis on conterminous states

Regional P-wave travel times, source region velocity models and relative location techniques are developed and evaluated for application toward improvement of the location accuracy of earthquake hypocenters. A laterally variable velocity model of the crust and upper mantle under the conterminous United States will be evaluated in 1974.

A major revision of the sequence of hypocenter computational programs used by the National Earthquake Information Service will begin in 1974. The programs will be rewritten for use on the DEC 1070 computer at the Denver Federal Center and will incorporate new criteria for association of data from discrete earthquakes. Focal mechanisms of the major or important earthquakes will be published.

The tectonic framework of seismic regions will be analyzed on a continuing basis through investigation of aftershock locations, magnitudes, origin times, and focal mechanisms. Determination of hypocenters with fixed network, master event and joint location techniques will improve the relative accuracy of the computations.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0168. SOUTH CAROLINA SEISMICITY PROGRAM

A.C. FARR, U.S. Dept. of the Interior, Geological Survey, Boulder, Colorado 80302

States to which project pertains: South Carolina

Because of the occurrence of the great 1886 Charleston earthquake, the seismic hazard for the state is potentially great, especially for existing facilities such as the Savannah River plant and the construction of new nuclear reactors. Any estimate of that hazard must be based on sound quantitative data which heretofore have not been available. Understanding why this area is seismically active, and comparing it with other seismic areas in the context and broader scope of the theories of plate tectonics, should aid in the greater clarification of the seismicity of the entire East Coast.

The objectives of the program are: 1. Provide essential high quality raw seismic data from earthquakes in South Carolina. 2. Compute accurate estimates of event and source parameters: i.e., hypocenter parameters, fault plane solutions (individual & composite), spectral analyses (stress drop and other source parameters). 3. Provide a catalog of events and source parameters that will be used in further evaluation of seismic hazard: maps, depth sections, statistics. 4. Conduct special seismological studies as they are indicated, such as network calibration with explosions and refinement of hypocenter parameters via ray-tracing. 5. Respond with rapid estimates of event parameters if a large event ( $M$  about 4 1/2) occurs within South Carolina during the duration of the

principal objective is to provide a geologic base for a continuing study of the environmental geology of the region. This is part of a larger project to study the central Rio Grande trough in areas of major population centers. Emphasis is being placed on geologic studies of the Cenozoic fill within the trough where recent faulting, slope stability, ground and surface water, and waste disposal problems require geologic background for potential land use.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0170, GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA

J.M. CATTERMOLÉ, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: South Dakota.

The Rapid City project is a general geology and engineering geology study of a rapidly growing urban area. Three quadrangles, Rapid City West, Rapid City East, and Rapid City NW, have been mapped geologically at a scale of 1:24,000. The maps of the Rapid City West and Rapid City East have been published in the Geologic Quadrangle Map Series in full color with a columnar section and text; the map of the Rapid City NW quadrangle was scheduled to be printed in 1973 and should be released early in 1974.

The final product of the project is a two part Bulletin covering the entire urban area of Rapid City: the first part will describe the geology, structure and stratigraphy of the three quadrangles; the second part will detail foundation conditions, expansive soils, construction materials, landslides, and physical characteristics of each formation and the pertinent effects related to planning engineering projects.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0171, EARTH AND ROCKFILL DAM DESIGN PRACTICES

L.M. CHRISTIANSEN, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

A continuing program to improve Earth Dam Design practices is being pursued through evaluation of construction performance, structure performance measurements, operation and maintenance experience and review of literature. Collected data is evaluated from time to time and compared to previously established design practices. Modifications are then introduced in the design practices, data collection procedures, measuring apparatus, or methods of analysis and evaluation to reflect the effect of accumulated experience.

Current operations include: Improved piezometer design to register negative pressures and reduce failure in installations. Statistical appraisal of construction variation in compaction of materials and establishment of conditions for testing. Development of standards for earthquake hazard evaluation. Improvements in stability analysis.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

### 3.0172, GREATER ANCHORAGE AREA BOROUGH, ALASKA

E. DOBROVOLNY, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Alaska.

In consequence of the geologic effects of the Alaska

final stages of compilation for the Greater Anchorage Area Borough, which encompasses about 1,750 square miles. Study of Quaternary deposits is emphasized because most land-use development is concentrated on them. Special-purpose maps, such as slope stability, construction materials, and foundation and excavation conditions are being prepared from the general geologic map for use by planners and developers. The geologic work is closely coordinated with hydrologic investigations being conducted by the USGS Water Resources Division. Data developed by these combined studies are adequate to establish patterns of geologic and hydrologic relationships applicable to regional planning. For specific site development, however, more detailed and intensive investigation is required.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0173, EARTHQUAKES AND ACTIVE FAULTS

J.S. DODD, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

The primary objective of this program is to obtain knowledge of the crustal strain at the surface and at depth that develops along an active fault. Such information will direct our efforts toward the critical and equally important matter of controlling or avoiding disastrous damage to hydro projects by earthquakes.

To obtain fundamental knowledge of earth strain and associated earthquake behavior a 5-year cooperative program with United States Geological Survey is in its third year. The program consists of recording low-magnitude earthquakes and measuring earth displacements and strains associated with three very active geologic faults - the San Andreas, the Sargent, and the Calaveras - in the Hollister Valley of Central California.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

### 3.0174, NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE

M.F. KANE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The principal objective of the project is to attempt to establish the location of main strand or zone of the New Madrid fault system through whatever effect it may have on the magnetic basement rocks, and its subsequent expression in the aeromagnetic field. Complementary studies will be undertaken in gravity by compiling and analyzing existing data.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0175, ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA

R.W. LEMKE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Alaska.

Reconnaissance engineering geology studies, directed principally toward assessing potential earthquake and other geologic hazards, have been completed in the following Alaska coastal towns: Skagway, Haines, Sitka, Ketchikan, Metlakatla, Petersburg, Wrangell, Yakutat, Hoonah, Nome, Bethel, Dillingham, Naknek-King Salmon, Unalakleet, Kotzebue, and Barrow. It is concluded that most parts of these towns are built on more stable geologic materials than those

liquefaction, and subsidence due to soil compaction. In addition, harbor areas and other low-lying parts of some towns may be damaged by vertical changes in the land, by seismic sea waves, and by other abnormal waves produced locally by land tilting or by submarine landsliding.

Reports on the southeastern Alaska region, Haines, and Skagway have been released in open file, and reports are in various stages of preparation for the other communities. As of early 1973, this large project has been restructured, and report preparation responsibilities for Sitka, Metlakatla, Hoonah, Yakutat, Bethel, Naknek-King Salmon, and Unalakleet assigned to project 9550-00948.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**3.0176, DENVER METROPOLITAN AREA, COLORADO**  
*R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

States to which project pertains: Colorado.

The project objective is to prepare detailed general-purpose geologic maps of eight quadrangles covering the major part of the Denver metropolitan area. These maps, at a scale of 1:24,000, are designed to provide basic information on the geologic factors pertinent to maximum utilization of land in a rapidly expanding area of urban development. Information to be provided concerns the engineering properties of the surficial and bedrock units, location of potential hazards such as landslides, areas subject to flooding, areas subject to possible earthquake damage, areas of poor foundation conditions, and the location and extent of sand and gravel deposits necessary for construction aggregate materials.

The geologic maps, each including a brief descriptive text, are to be released first in open files and subsequently published in the Geologic Quadrangle Map Series. The geologic map of the Parker quadrangle was published in 1972 as the first sheet in a special Folio of the Parker quadrangle. Thirteen additional single-concept maps of the quadrangle have been or will be published in the near future to complete the Folio. The enthusiastic acceptance of the Parker Folio by planning commissions and public officials have prompted plans to issue some similar interpretive maps for the adjoining Highlands Ranch quadrangle.

A comprehensive geologic report covering all eight quadrangles is planned for the Bulletin series.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**3.0177, V. A. HOSPITAL SITE EVALUATIONS**  
*T.C. NICHOLS, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

States to which project pertains: Various states in the U.S. and Puerto Rico.

Conduct reviews on the completeness of geologic content and on specific geological aspects of seismic evaluation reports on Veterans Administration Hospital sites as submitted to the V. A. by consulting firms.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**3.0178, SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO**

*S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

The tectonic framework of the Snake River Plain and adjoining ranges is being analyzed to provide a basis for realistic appraisals of seismic and associated hazards along the Idaho segment of the Intermountain seismic belt. Abundant evidence

Regional geologic and geophysical data suggest that the geodynamics of continental plateaus of flow. SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**3.0179, EASTERN SNAKE RIVER PLAIN INVESTIGATIONS - IDAHO**

*S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

Principal objective is to coordinate Survey investigations and encourage other geologic studies of the Snake River Plain for the derivation of land resource information for planners and decision makers.

Aims are: To minimize earthquake, slide, and volcanic hazards in this northern part of the Wasatch seismic belt; to develop the development of wise environmental policies for public lands. To provide data for planning in the development of this balanced agricultural and urban region and growing part of Idaho. To develop a framework for aquifer and waste-disposal studies where increasing wastes threaten a major aquifer and the mineral resource and geothermal potential of the region.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**3.0180, TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF AN EARTHQUAKE CONTROL EXPERIMENT - NEVADA, NEVADA, UTAH**

*P.P. ORKILL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

One of the program goals of the Geologic Hazards Reduction Program is to develop the capability of earthquake control on real faults. The Tectonics Project is an integral part of an earthquake modification experiment, and will therefore be closely associated with associated studies of seismicity, strain, and hydrology.

The sparsely populated Great Basin of Nevada and parts of California and Utah contains many seismic areas where an earthquake modification experiment safely conducted on faults similar to the San Andreas and other faults of western California. Historic large earthquakes (magnitude 6 or greater) accompanied by surface faulting have occurred in a belt from Owens Valley in the north-northeastward through Mineral and China Lake, Nevada. This belt follows and crosses known strike-slip zones such as the Death Valley fault system, the Walker Lane, Surface Breakage Zone, and part of this belt has had a strong compressional motion. Other parts of the Great Basin, though, the site of large earthquakes are currently active and contain faults of known Pleistocene and Holocene placement.

The bifold purpose of the Nevada Tectonics Project is to provide the appropriate geologic and tectonic information to assist in the selection of a site in the Nevada earthquake modification experiment, and (2) to develop a comprehensive understanding of the tectonic framework of the Nevada region, with emphasis on tectonism. An understanding of the tectonic framework is needed to provide a scientific basis for earthquake hazard and for evaluation of sites for an earthquake modification experiment.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

D. SCHLEICHER, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

This project is part of a study of the eastern Snake River Plain, whose aim is to gather geologic data needed for land-use planning. I plan to prepare one or more maps at scales 1:250,000 and larger showing geologic units and structures that represent hazards or resources. In the core of the Beaverhead Mountains, the main emphasis will be on working out the stratigraphy as to decipher the structures that can be extrapolated beneath the volcanic rocks of the Snake Plain. On the surrounding flats and the flanks of the range, the plan is to map the young volcanic rocks and sediments, to identify and date young faults and volcanic eruptions, and to note other potential hazards.

The study area is bisected by the southern end of the Beaverhead Mountains, which are cored by Mississippian and Pennsylvanian carbonates and quartzites, whose stratigraphy remains poorly known. The rocks are slightly to severely deformed, with local complex folding and thrusting. The range is separated from the surrounding flats by range-front faults; the faults are probably younger on the west side of the range than on the east where they are mantled by ash-flow tuffs intercalated with tuffaceous, partly cemented fan gravels that are probably a few million years old. The absence of young faults accords with the absence of epicenters reported here during this century. The area has geothermal potential, reflected by Lily Hot Springs and the springs feeding Warm Creek, and suggested by a hitherto-unrecognized intrusive plug at the south end of the Beaverheads. Extensive alluvial aprons may yield water, and areas of silty soil (reworked loess?) may prove arable.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0182, SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO

B. SKIPP, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The project involves the mapping, to be compiled at 1:250,000, of all or parts of thirty 7½ quadrangles, situated along the southwestern part of the northwest flank of the eastern Snake River plain. The chief objectives are: (1) the understanding of the little known Late Paleozoic rock sequences through stratigraphic and paleontologic studies; (2) the determination of the complex structures which involve the Paleozoic sequences; (3) the determination of the structural relationships between the Paleozoic rocks and the Holocene lava flows along the north edge of the Snake River Plain; (4) the providing of a geologic framework for environmental studies in the region; (5) the study of recent faulting and landslide distribution possibly related to earthquake activity; and (6) the supplying of a well-mapped area adjacent to Snake Plain which will aid in interpretation of gravity and aeromagnetic surveys across the plain.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0183, EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE

D.A. TIEDEMANN, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

The soil foundation is an important consideration in the design of structures resistant to earthquake damage. The investigation

Laboratory tests on possible problem soils are conducted in special laboratory equipment involving a cell for applying triaxial conditions, but with an additional pulsating load system for simulating earthquake activity. The testing has been extended from sands to a program on silt which is investigating effects of placement density and moisture on the dynamic behavior of the silt. Tests with new resonant column equipment are being conducted on soil specimens for correlation with the above-mentioned tests on silt.

New laboratory equipment is being designed, constructed, and assembled to accommodate larger specimens for determination of dynamic properties. For this testing a variable vibratory input can be programmed. Also field vibratory testing methods are being improved. These developments will lead to better test data for improved design of earth and earth-supported structures.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

### 3.0184, HAMILTON 2 DEGREE

J.D. WELLS, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Montana and Idaho.

Prepare a geologic map of the Hamilton 2-degree sheet at 1:250,000 scale, integrating the past, current, and future pertinent mapping done by industry, universities, and State and Federal agencies, and incorporating geologic, geochemical, isotopic, and geophysical data as a basis for evaluation of land use and mineral potential. Special purpose interpretative maps and reports will be prepared of appropriate areas where potential hazards such as landslides, unstable foundation material, faulting, earthquakes, and flooding are present. An evaluation of known and potential mineral resources of base and precious metals and fluorite along the margins of the Idaho Batholith and stratabound copper in the Beltian strata will be made. These data will contribute to the general body of geologic knowledge of the northern part of the Idaho Batholith and contribute in developing the regional structural, stratigraphic, magmatic, metamorphic, and erosional patterns. They will further provide a proper basis for land use planning for the diverse interests in this area of urban development in an outstanding recreational area.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0185, SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO

P.L. WILLIAMS, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The purpose of the project is to geologically map, at scales of 1:250,000 and larger, the volcanic rocks of the eastern Snake River Plain and its margins. Major scientific objectives are to delineate the late Cenozoic volcanic and tectonic history in detail, to locate eruptive centers for basalt flows and for rhyolite ash-flow tuffs in relation to major structures, Quaternary faults, and geothermal areas, and to determine petrogenesis of the rocks. From the basic geologic data, derivative maps will be prepared showing potential earthquake and volcanic hazards, geothermal energy potential, construction materials and mineral resources, environmental aspects of trace element distribution, aquifers and liquid waste disposal sites, potential recreation areas, and other topics needed for land-use planning.



be taken to minimize damage to buildings and earthquakes. It is based on a careful review of events during and following the disaster that befell south central Alaska in March 1964. Emphasis is on lessons to be learned from the Alaskan experience that can be applied to any region where strong earthquakes may be expected.

The Committee's recommendations are given in the first chapter. The second chapter presents the more detailed conclusions reached by the seven specialized panels among which the Committee's work was divided. The final chapter is a brief recounting of the major events of the Alaska earthquake and its aftermath, to call to mind the experience on which the recommendations are based.

Pub. 1969, 35p. Printing and Publishing Office, Natl. Academy of Sciences, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY Natl. Academy of Sciences - Washington

### 3.0187, SEISMIC DESIGN FOR BUILDINGS

UNKNOWN, U.S. Army, Washington, District of Columbia

This updated manual was prepared to govern design of facilities for the U.S. Army, Navy and Air Force in areas subject to seismic events and supersedes the March 1966 issue. It was the intent not only to state basic criteria, but to also provide consistent extension of short-form requirements, commentary and design examples for design for resistance to earthquakes. Methods and factors specified were selected to provide sound design against earthquakes for most structures at relatively low cost. More highly refined techniques for many areas of design are not covered but their use is not precluded in the manual.

A basic citation is made to the 'Recommended Lateral Force Requirements and Commentation' by the Structural Engineers Association of California (SEAOC). Some of the concepts and applications added for general earthquake-resistant design practice are the design of supports for mechanical and electrical elements within and adjacent to structures, recognition of differences in overall loss potential for facilities, and application of, for high loss potential facilities, higher acceleration forces than previously used for certain areas. Other new considerations for general practice are included.

The proponent agency of this manual is the Office of the Chief of Engineers. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications) to HQDA (DAEN-MCE-A) WASH DC 20314.

Pub. April 73; 420p., Army Tm 5-809-10, Navy NAV FACP-355, Air Force AFM 88-3, Chap. 13.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0188, BUILDING PRACTICES FOR DISASTER MITIGATION

C.G. CULVER, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

Reasons for starting or progress last year: Land use and construction regulations containing strong disaster mitigation features can in the long-run alleviate losses by natural disasters. This program focuses on earthquake and extreme wind hazards and deals with building practices relative to new and existing buildings for mitigating losses.

One portion of the project culminated in a report (BSS 46, Building Practices for Disaster Mitigation) which: evaluates

a second portion, a computerized evaluation of existing building natural hazards evaluation of existing buildings developed. Data collection forms for use in buildings were also developed. Simplified analytical methods for building evaluation are under development.

Approach: The current activities focus on developing a comprehensive seismic code applicable to all areas of the United States. Leading design professionals, research organizations and technical organizations indicated that the development of an improved code is a high priority item in any effort toward reducing future life and property loss resulting from earthquakes. The NBS in consultation with the professional design and research community will conduct a program to develop and implement a comprehensive national seismic code. Provisions contained in the code would include aspects of building systems, structural as well as nonstructural, and applicable geotechnical practices. It is based on the performance concept clearly setting the level of risk associated with the various code provisions.

Expected results: The methodology for survey and evaluation of existing buildings will be completed and a comprehensive report detailing the technical procedures involved will be produced.

For the seismic code activities, a detailed work plan will be developed, task committees will be organized and an inventory of the code provisions developed.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

### 3.0189, STRENGTH OF EXISTING MASONRY WALLS

S.G. FATTAL, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234 (461)

Reasons for starting or progress last year: In FY73 completed a study on behalf of the Veterans Administration to assist them in developing a methodology for determining racking and out-of-plane flexural strengths of masonry elements in existing VA hospital buildings to ensure structural integrity in earthquakes. In FY73 a contract was negotiated for additional NBS technical assistance in FY74 in: (a) developing an alternate sampling method for evaluation of flexural strength; (b) assessing limiting deflections of masonry partitions (c) examining an approach for evaluation of critical stress conditions in masonry building elements under seismic loads.

Approach: The approach will be similar to that used in the initial study. A literature survey will be used to prepare a state-of-the-art synthesis of experimental and analytical data and to develop a methodology for reliable and consistent prediction of strength and stiffness of masonry wall elements in existing VA structures.

Expected results: This study will begin in July 1973 and a draft will be submitted to VA by the end of September 1973. The final report incorporating the findings from FY73 and FY74 projects is expected to be submitted to VA by the end of FY74.

SUPPORTED BY U.S. Veterans Administration

### 3.0190, INELASTIC RESPONSE OF BUILDINGS TO EARTHQUAKE STRUCTURAL RESTORATION

S.G. FATTAL, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

Reasons for starting or progress last year: The objective of this project is to evaluate the recommendations of the proceedings of the Workshop on Building Practice for Disaster Mitigation.

clude avoidance of human distress and reduction of property loss caused by natural disasters. Recommendations B43 and B45 underscore the need for experimental research into the inelastic response of structural elements to define strength, ductility, and damping characteristics. Recommendation B28 stresses the need for improved technology to restore damaged buildings. The lack of adequate experimental basis in this area is further evidenced by the current efforts of the Veterans Administration and other Government agencies in their search for methods to strengthen existing structures and to repair buildings damaged in past disasters. The objective of this project is to implement the recommendations described herein.

**Approach:** To meet the dual objectives of investigating the inelastic response of structural elements and the structural effectiveness of repair technology this project will consist of three phases. Phase 1 will comprise an extensive interaction, through an NBS workshop, with agencies having major interest and involvement in structural rehabilitation, in order to document the current state of technical knowledge and existing practice and to define the gaps in this knowledge for preparation of the second phase. Phase 2 will be an extensive experimental program which will include (1) testing of structural elements under cyclic loading in the inelastic range to study degradation of strength, ductility and energy dissipative capacity; (2) repair and testing elements subjected to prior testing history defined in (1) to determine the degree of restoration achieved, and (3) testing of methods strengthening various structural types such as application of epoxy to repair concrete elements. Phase 3 will be an extensive documentation of test results and their synthesis to provide criteria for evaluating structural response of elements and recommended procedures for their repair and restoration of strength.

**Expected results:** Phase 1 will be started and completed this fiscal year. Phase 2 will start in the last quarter of this fiscal year.

**SUPPORTED BY** U.S. Dept. of Commerce - N.B.S.

### 3.0191, DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS

**W.F. REPS,** U.S. Dept. of Commerce, Center for Building Technology, Washington, District of Columbia 20234

**Abstract:** The report provided technical information regarding characteristics of materials and building systems, and discusses the structural performance of buildings subjected to the action of earthquakes and wind forces with specific reference to structures typical of developing countries. Potential ways are described in which structures can be made more resistant to such action. Siting considerations are discussed from a geological, seismic and climatological viewpoint, and recommendations relating to siting problems are made. Techniques of housing construction, both traditional and industrialized, are described and improvements resulting in better earthquake or windstorm resistance are suggested. Building codes, their improvement and their enforcement are also discussed.

**Pub. Jan 74: 153p., NTIS No. Com-74-50184/2: PC-GPO MF \$1.45, NTIS**

This project will concentrate on updating, expanding and substantially revising the present seismic code to incorporating recent research results. Code goals will be developed and clearly set forth such that appropriate regulatory bodies can recognize the level of risk associated with the various code provisions. The expanded comprehensive seismic code will cover all aspects of building and geotechnical practices to mitigate the effects of earthquake disasters. Provisions for architectural, mechanical and electrical features of construction will be included. Considerations of seismicity, geologic and soil site effects, and soil structure interaction will be incorporated. The required loading criteria and performance criteria will be explored in depth and codified. Design procedures for structures other than those presently contemplated by the code will be made. A detailed commentary on the code will be prepared.

**SUPPORTED BY** U.S. Natl. Science Foundation

### 3.0193, EARTHQUAKE DESIGN FOR MASONRY STRUCTURES

**F.Y. YOKEL,** U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234 (4615364)

**Reason for starting or progress last year:** The project was successfully promoted and funds were obtained from industry to support the first year's effort. Preliminary meetings were held by professionals and industry representatives to plan strategy and initial steps were taken in an effort to obtain support from other federal agencies.

**Approach:** The project will have three phases: (1) A state-of-the-art study will compare existing standards, codes, and informal design practice with the state-of-the-art, compile test information, identify gaps in knowledge and information that must be filled by additional research, and develop interim design recommendations; (2) A test program, designed to develop information on such parameters as strength, stiffness, ductility and damping and evaluate the performance of various design details; (3) The synthesis of results and development of design criteria that can be proposed for adoption in codes and standards.

**Expected results:** In FY 74 work will commence on the state-of-the-art study and gaps in knowledge will be identified in order to develop the information required for the start of the testing in spring, 1974.

**SUPPORTED BY** Natl. Concrete & Masonry Assn. - Arlington

### 3.0194, DESIGN CRITERIA FOR MASONRY

**F.Y. YOKEL,** U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

**Reasons for starting or progress last year:** A draft report 'Strength of Masonry Walls under Compression and Flexure' was prepared by Dr. Fattal and is currently under review in the Section. Dr. Yokel became Chairman of ANSI Committee A.41. Dr. Fattal became member of ACI Committee 531. An experimental investigation of anchorage of masonry veneers was started by Mr. Cattaneo following a review of the literature. A cooperative program of research between industry and the Federal Government has been established by NBS to develop improved procedures for the design of masonry structures in seismic regions. This project responds to the need for more information on the response of masonry struc-

of all participants. The task phases are: (1) an initial study will compare existing standards, codes, and ad hoc design practice with the state of knowledge, compile information, identify gaps in knowledge and information that must be filled by additional research, and develop interim design recommendations; (2) a research program, based on the conclusions from (1) and designed to develop information on such parameters as strength, stiffness, ductility and damping, and to evaluate the performance of various design details; (3) the synthesis of results and development of design criteria that can be proposed for adoption in national standards.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

### 3.0195, FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD

F. Y. YOKEL, U.S. Dept. of Commerce, Building Research Div., Washington, District of Columbia 20234

Abstract: Tests were carried out on a house to determine its deflection characteristics under lateral loads. The house is a two-story building of conventional wood-frame construction. Two series of tests were conducted. The first of these was to determine the stiffness of the house when subjected to a simulation of wind loading. The second was to determine the dynamic response of the house to a single impulse load. The report presents the results of these tests.

Pub. Mar. 73, 30p., NTIS No. COM-73-50315; PC-GPO MF \$0.95-NTIS

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

### 3.0196, REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Fed. Insurance Administration, Washington, District of Columbia 20410

Abstract: Although California and Alaska are more vulnerable to earthquakes than other States, all but a few have experienced some earthquake activity. A severe earthquake in a densely populated area could cause heavy loss of life and billions of dollars of property damage. Earthquake insurance is readily available on one to four family dwellings throughout the United States. Earthquake insurance premiums on dwelling properties are neither excessive nor unreasonable. Earthquake insurance on commercial and industrial properties is available, but its availability is limited because of the exposure. A broader program than that now offered by the private insurance industry is precluded by present deficiencies in knowledge and data concerning earthquake occurrences and by the inadequacy or absence of hand use and control measures to reduce earthquake losses.

Pub. 1971: 120 p., NTIS No. PB - 206 791; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 3.0197, SEISMIC HAZARDS AND LAND-USE PLANNING

D. R. NICHOLS, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Basic earth-science data are necessary for a realistic assessment of seismic hazards and as a basis for limiting corrective land-use controls only to those areas of greatest hazard. For example, the location, character, and amount of likely displacement and activity of surface faulting can be predicted if detailed geologic maps and seismicity data are available. Structures can be located off active fault traces, they should be located off active fault traces, varying with the character of faulting, the character of the fault traces, and the importance of the structure. Recreational activities and other non-land uses should be considered for fault zone areas if the land is under pressure for development; otherwise, areas should remain as open space.

Two methods of predicting ground shaking effects are related to land-use decisions: (1) Relative earthquake hazard can be related to firmness of the ground and can be used as a gross way to allocate population density in the more sophisticated analyses; and (2) intensity maps (a) damage from former earthquakes, or (b) analyses of geologic units added to a design earthquake hazard model are used with caution to predict ground shaking effects. Fully adequate methods of predicting ground shaking effects remain to be developed. When decisions do not reflect likely ground shaking effects, building codes are needed, particularly for critical structures.

Ground failure (landsliding, ground cracking and differential settlement, sand boils, and subsidence) results from liquefaction, loss of soil strength, or erosion. Areas suspected of being most likely to fail should be developed unless detailed site studies can demonstrate that hazard does not exist or can be overcome. Various methods can be used to reduce the high, long-term public hazard from development of unstable ground. However, ground failure due to tectonic deformation generally cannot be avoided, nor can effects of such deformation be minimized.

Large water waves, such as produced by tsunamis, sea dam failure or overtopping, can be anticipated in some places. (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0198, PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RECREATION PLANNING STUDY

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Abstract: A comprehensive guide to a study of the San Francisco Bay Region describes a 4 year demonstration study conducted jointly by the Geological Survey and the Department of Housing and Urban Development designed to improve urban development decisions through application of innovative earth science concepts. Urban-related environmental studies include faults and earthquake hazards, landslides and slope stability, physical and chemical properties of San Francisco Bay and its circulation patterns, water quality and pollution subject to flooding, water supply and waste disposal, and available mineral and water resources. Planning elements described include state-of-the-art review, a feasibility study of incorporating earth-science data into urban planning information systems, and application of demonstration studies.

Pub. Oct. 71: 121p., NTIS No. PB-206 826; PC \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0199, PROTECTION OF TRANSPORTATION

*UNKNOWN*, U.S. Dept. of Transportation, Natl. Transportation Safe. Bd., Washington, District of Columbia 20591

**Abstract:** The study is an examination of Federal involvement in the earthquake field, specifically in the transportation field. The study discusses the need for reexamination of the criteria used in the design of transportation structures, stepped-up earthquake-related programs, and better coordination between Federal agencies. It also discusses earthquake history in the United States, existing standards for earthquake-resistant design and construction of transportation systems, and possible modifications to existing transportation structures.

Pub. Feb. 72: 41p., NTIS No. PB-210 270: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - N.T.S.B.

### 3.0200, REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES

*K.P. STEINBRUGGE*, U.S. Exec. Office of the Pres., Off. of Science & Technology, Washington, District of Columbia 20006

The report presents and discusses the Task Force's 20 high priority recommendations comprising a National Action Program for the reduction of human suffering and property damage attendant upon an earthquake, including the earthquake-associated geologic and non-geologic hazards.

Pub. Sept. 1970: 54p., No copy info. available.

Abstract provided by FDAA.

SUPPORTED BY U.S. Executive Office - O.S.T.

### 3.0201, EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES

*UNKNOWN*, U.S. Veterans Administration, Hospitals Clinics & Reg. Off., Washington, District of Columbia 20420

This handbook sets forth requirements for earthquake resistant design of VA hospital facilities. The requirements are derived from current research in earthquake engineering, the advice of specified consultants, and the technical expertise of the members of the VA Earthquake and Wind Forces Committee. The seismic design requirements are based on the Uniform Building Code and include provisions which are in addition to those in the Uniform Building Code. These requirements will be included in a full study report which is planned for publication in 1974.

Pub. March 74: 36p., Handbook H-08-8.

Abstract provided by FDAA.

SUPPORTED BY U.S. Veterans Administration

### 3.0202, A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES

*L.T. LONG*, Georgia Inst. of Technology, School of Geosciences, Atlanta, Georgia 30332

The Southeastern United States is an area of infrequent occurrence of large earthquakes. The sparsity of data, particularly the lack of quality seismic stations, hinders the evaluation of seismicity and seismic risk and hinders the evaluation of focal mechanisms. The importance of data on seismicity and earthquake mechanism is emphasized by the potential for

areas. Over the past year data has been obtained in the field with smoked-paper microearthquake technique in the Southeast United States. Coupled with studies of 'b' values and magnitudes these preliminary studies indicate that the technique appears to have the greatest potential significance in obtaining focal mechanisms and aftershock locations. Consequently, the proposed research will emphasize continuation of earthquake monitoring in known active areas and detailed studies of large events (ML approximately greater than 3) in the Southeast.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0203, EARTHQUAKE EFFECTS ON STRUCTURES

*J.D. PRENDERGAST*, U.S. Army, Construction Engin. Res. Lab., Champaign, Illinois 61820

Develop an appendix for TM 5-809-10, 'Seismic Design For Buildings' which prescribes a more rigorous and improved seismic design procedure to be utilized in the design of critical military facilities (hospitals, communication centers emergency power stations, fire stations, etc) located in regions of high seismicity.

The procedures and tools required by a designer to implement a more rational seismic design method will be developed. The seismic design method will prescribe procedures for establishing a definition of the seismic input for critical military structures in the form of a design ground-motion spectrum, illustrate the various methods for utilizing the design ground-motion spectrum in the design and analysis process, provide the designer with the structural analysis techniques and procedures to evaluate and predict the basic earthquake performance of structural systems comprising critical facilities, and establish structural design criteria which limits the deformation levels at which earthquake forces are to be resisted by the structure.

Supporting agency address information: OCE Construction Engineering RES Lab, Champaign, IL 61820

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0204, TECHNIQUES FOR RETROFITTING EXISTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE

*ROBINSON*, IIT Research Institute, Chicago, Illinois 60616 (045304)

The purpose of the study is to identify and define, through structural analyses and supporting laboratory tests, practical techniques and criteria for retrofitting existing bridges to increase their resistance to seismic forces. Task 1: Bridge selection, definition of seismic environments and preparation of analytic models. Task 2: Seismic Analysis. Task 3: Identification of failed components bridge rating. Task 4: Develop retrofit concepts and determine relative costs. Task 5: Laboratory Experiments. Task 6: Refinement of Retrofit Concepts.

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

### 3.0205, STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS

*A.E. AKTAN*, Univ. of Illinois, School of Engineering, Urbana,

3.0206.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0206, EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN***A.E. AKTAN, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801*

**Abstract:** Although there has been a considerable number of studies on the dynamic response of reinforced concrete in recent years, effects of multi-dimensional interaction on the dynamic response of reinforced concrete have received virtually no attention. This study was carried out to obtain information on the static and dynamic multi-dimensional response of reinforced concrete. A finite-filament model was developed for this purpose. This model assumes a column segment to consist of filaments along its long axis and develops the system properties through the stress-strain hysteresis characteristics and history of these filaments during analysis.

Pub. May 73 141p., NTIS No. PB-220 89176; PC \$5.45 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0207, SEISMIC BEHAVIOR OF FRAMED TUBES***J.C. ANDERSON, Univ. of Illinois, Graduate School, Urbana, Illinois 61801*

The framed tube is a relatively new concept in building design in which the exterior frames of the structural system consist of closely spaced columns connected by spandrel shear beams. The purpose of this research is to design framed tube structures for typical reinforced concrete buildings and to evaluate their inelastic behavior when subjected to strong ground motions. The framed tubes are designed for combinations of dead load, live load, wind load and earthquake load as specified in the Uniform Building Code.

All members are assumed to follow a bilinear hysteresis curve which includes the following two modifications: (1) the influence of axial load on the yield moment of the columns is considered using an interaction diagram and (2) the influence of stiffness degradation is considered by relating the elastic stiffness to the ductility requirement. The inelastic behavior of the structure is evaluated in terms of the following response parameters: ductility requirement of the spandrel beams, ductility requirement of the columns, maximum story displacement, maximum story to story displacement, maximum plastic rotation of beams and columns and maximum envelope of story shear.

SUPPORTED BY University of Illinois

**3.0208, PROBABILISTIC METHODS IN CIVIL ENGINEERING***A.H. ANG, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801*

Existing risk and reliability models will be applied to the evaluation of safety and performance of structures subjected to dynamic forces of natural hazards. Specific studies will include: (1) The evaluation of risks implied in current structures built to resist specific natural hazards; e.g., structures that are designed to resist earthquakes in accordance with current seismic provisions. This will require the evaluation of risk and reliability of structural components designed according to current seismic provisions.

praised, and additional models developed where needed for specific types of systems. (3) Finally, a stochastic method will be developed for the practical dynamic analysis of multi-degree-of-freedom systems, to provide probabilistic response information required in the evaluation of risk to dynamic natural hazards.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0209, ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES***J. GILABOUSSI, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801*

The saturated granular soil is modeled as a fluid-saturated medium. Nonlinear material properties are assigned to the soil in order to simulate the stress dilatancy of the soil under shear deformation which is an important factor contributing to pore pressure build-up leading to liquefaction. Finite element is used for spatial discretization and the governing nonlinear matrix equation of motion is integrated by a time-marching integration scheme. The research is to develop methodology for the assessment of liquefaction potential in soil structures with arbitrary geometry subject to arbitrary dynamic loading.

SUPPORTED BY University of Illinois

**3.0210, RESPONSE AND ENERGY DISSIPATION OF REINFORCED CONCRETE FRAMES SUBJECTED TO STRONG BASE MOTIONS***P. GULKAN, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801*

**Abstract:** The report contains tests and analyses of reinforced concrete frames subjected to simulated earthquake ground motions. Pub. May 71: 304p., NTIS No. PB-202 946; PC \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0211, EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS***M.A. SOZEN, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801*

This amendment to NSF grant GK 25386X continues the completion of the research begun under the original grant. This research is aimed at the general objective of understanding and formulating analytically the energy dissipation mechanisms of reinforced concrete structures subjected to destructive earthquakes and introduces two important features: axial loads and multi story frames.

A number of experiments will be run making use of an earthquake simulator. Two basically different loading will be used in the tests: inertia loading and loading by imposing displacements. In one case, the specimens are developed in a mass attached to the specimen introducing accelerations at the base of the specimen and in the other and simpler case, the specimen is loaded by imposing a deformation at a prescribed level. The loading is necessarily a dynamic test and is conducted on the earthquake simulator. The imposed deformation may involve rapid or slow (static) loading.

SUPPORTED BY U.S. Natl. Science Foundation

## MAJOR DISASTER TYPES

The main objective is to improve the structural design and construction process as related to earthquake-resistant design. During the first two year research included: (1) tests on half-scale spirally reinforced concrete columns, (2) an experimental investigation of the hysteretic behavior of reinforcing bars, (3) an inelastic dynamic response analysis of the main building of the Olive View Medical Center, (OVMC), (4) a pilot study to estimate the effect of horizontal two-dimensional motions on the response of the main building of OMC, and (5) exploratory studies for the development of an attractive model for a design method, i.e., the substitute-damping method. During the third year, the research will include (1) testing of a series of five reinforced concrete models (representing 3-story structures having structural walls and frames) dynamically and statically to provide basic information for the development of a generally applicable design method, (2) subjecting reinforced concrete columns to simultaneous base motion in two horizontal directions, and (3) the development of the substitute-damping method into a generalized design method.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0213, PROBABILISTIC MODELING OF EXTREME LOADS

**Y.K. WEN**, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

This project deals with probabilistic modeling and risk analysis of extreme environmental loads caused by tornadoes, hurricanes and earthquakes. The physical aspects of the natural phenomena which cause these loads are incorporated into the formulation and the occurrences of these loads are modeled by random processes. The results are presented in a form suitable for practical applications.

SUPPORTED BY University of Illinois

### 3.0214, SHEAR STRENGTH DECAY IN REINFORCED CONCRETE COLUMNS SUBJECTED TO LARGE DEFLECTION REVERSALS

**J.K. WIGHT**, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

Abstract: The report contains an analysis of a series of tests of reinforced concrete columns subjected to cyclic loading.

Pub. Aug 73: 309p., NTIS No. PB-255 483/7; PC \$7.00 MF \$1.45.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0215, PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES

**T.L. PAEZ**, Purdue University, School of Civil Engin., Lafayette, Indiana 47907

Abstract: The consideration of dynamic loads due to wind storms or strong earthquakes can be significant in the safety analysis and design of structures. When these extraordinarily large loads occur, the behavior of most structures is non-linear and often results in plastic deformations. Because excessive deformations could cause a structure to fail, it is important to study the structural response beyond the linearly elastic range by applying probabilistic methods in the solution of structural engineering problems. A method is presented for computing the first-passage probabilities for linear and nonlinear structures. In addition, the probability

### 3.0216, SHEAR MODULUS AND DAMPING DESIGN EQUATIONS AND CURVES

**B.O. HARDIN**, Univ. of Kentucky, School of Engineering, Lexington, Kentucky 40506

Abstract: Equations and graphs for the determination of shear modulus and damping of soils, for use in design involving repeated loading or vibration of soils, are presented. These equations and graphs are based on numerous laboratory tests on both remolded and undisturbed cohesive soils on clean sands. Comparison of the measured values with the values shows good agreement. An example problem shows how these equations and curves are used in design.

Pub. Jul 70: 56p., NTIS No. PB-193 608; MF \$0.60

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0217, DENVER EARTHQUAKES

**L.E. GARONO**, U.S. Army, Edgewood Arsenal, Maryland

Abstract: The paper reviews the question of waste disposal by the Rocky Mountain Arsenal and the microearthquakes in the area.

Pub. 1970: 14p., NTIS No. AD-713 526; HC \$3.00

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0218, RESEARCH STUDIES AND RECOMMENDATIONS FOR EARTHQUAKE HAZARDS REDUCTION

**S.T. ALGERMISSEN**, U.S. Dept. of Commerce, National Oceanic & Atmos. Admin., Rockville, Maryland 20852

Objectives of the project include validation, refinement, and extension of existing techniques for the estimation of earthquake losses to structures; state-of-the-art seismic risk zoning; and to provide information and recommendations for action and research leading to earthquake hazard reduction through seismic risk assessment and appropriate land-use practice and control design criteria and building codes.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 3.0219, SEISMIC RISK STUDIES IN THE UNITED STATES

**S.T. ALGERMISSEN**, U.S. Dept. of Commerce, National Oceanic & Atmos. Admin., Rockville, Maryland 20852

Abstract: A new Seismic Risk Map of the United States is presented, together with strain release and Modified Mercalli intensity maps of the country. The occurrence of damaging earthquakes was not considered in assigning ratings to the various zones on the map. The studies of earthquake frequency are included in the map. The Seismic Risk Map is a revision of the Seismic Probability Map prepared by the Coast and Geodetic Survey in 1947 and withdrawn in 1964.

Pub. Jan. 69: 21p., NTIS No. COM-71-00106; PC \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - NOAA

### 3.0220, ALEUTIAN SEISMICITY - MILROW STUDIES

**E.R. ENGBAHL**, U.S. Dept. of Commerce, National Oceanic & Atmos. Admin., Rockville, Maryland 20852

A review of the spatial and temporal characteristics of the seismicity of the Aleutian Islands is presented.

3.0221.

tion are by a moving oceanic plate. The careful monitoring of earthquake patterns preceding and following MILROW revealed no evidence for any significant spatial or temporal changes in the natural seismicity. There occurred, however, immediately after detonation, in a zone not more than 3 miles in radius from ground zero, a swarm of hundreds of very small earthquakes which terminated abruptly 37 hours later at the time of the MILROW cavity collapse. Since they were very small, of short duration, and occurred in the immediate vicinity of the explosion, they are not believed to constitute a hazard to the major fault zone under Amchitka Island.

Pub. May 70: 59p., NTIS No. CGS-746-102; PC \$5.00 MF \$1.45

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0221. THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967

J.N. JORDAN, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

Abstract. On June 21, 1967, at 18.04:49.5, 18.13:02.9, and 18.24:45.7 Greenwich Mean Time, the Fairbanks region was shaken by three earthquakes of magnitudes 5.4, 5.6, and 5.4, respectively. The report is a preliminary interpretation of seismological data from permanent seismograph stations throughout the world, temporary seismograph and strong-motion seismograph stations established in the epicentral area, seismoscopes, intensity reports, and inspection of the epicentral area. Results from one accelerograph record and ten seismoscope records are presented in this preliminary engineering report in context with effects of the earthquake as determined by field investigation and questionnaire canvass.

Pub. 1973: 67p., NTIS No. COM-73-11446/4; PC \$5.50 MF \$1.45

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 3.0222. IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES

A.C. TARR, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

Uncertainties in routine PDE Mb estimates of Aleutian earthquake magnitudes often reflect the effects of station-source region biases and station detection-threshold magnitudes. Examination of magnitude data from aftershocks of the February 27, 1970, Aleutian Trench earthquake indicates that magnitudes of small aftershocks were consistently underestimated, since these events were observed primarily by Western United States stations having negative biases. The same general pattern is observed elsewhere in the Aleutian arc. Quantitative estimates of the station-source region biases using over five years of short-period P amplitude data confirm these observations. Correction for the station-source region bias significantly reduces the dispersion of station magnitudes about the mean and, in some cases, shifts the mean by as much as 0.3 magnitude unit.

Pub. May 71: 47p., NTIS No. CGS-746-115; PC \$4.50 MF \$1.45

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0223. ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1972

currence in the Aleutian Islands. Record arrival amplitudes were scaled by the Special Projects, Las Vegas, Nevada. Final reduction and collation of data, hypocenters and derivation of related parameters were performed by the Seismology Investigations Group, University of Maryland. This compilation is preliminary and subject to later revision on the basis of current research.

Pub. Jun. 72: 93p., NTIS No. CGS-746-132; PC \$5.00 MF \$1.45

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0224. ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971

UNKNOWN, U.S. Dept. of Commerce, Environmental Sciences Laboratories, Rockville, Maryland 20852

Tabulated preliminary data acquired during March 1971 from an Aleutian network of seismic stations are presented in order to facilitate current studies of earthquake activity in the Aleutian Islands. Each table includes information on date; station; phase; time of arrival of phase; group velocity; amplitude; period of phase; station magnitude; distance to event; station-to-epicenter azimuth; phase time residual; and descriptive remarks. Six tables are presented covering the Aleutian Islands from Unimak Island to Unimak Island on which are plotted earthquakes which were located during the month of March 1971. The network and by a world-wide seismicological stations.

Pub. Jan. 72: 73p., NTIS No. CGS-746-118; PC \$5.00 MF \$1.45

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0225. SEISMIC RESEARCH

R. MILLER, Stone & Webster Engin. Corp., Boston, Massachusetts 02109

Description: To develop methods for determining properties and dynamic response of soils under earthquake conditions. To investigate soil liquefaction and relate results to determining liquefaction potential at reactor sites from laboratory triaxial and other tests. To develop guideline procedures for evaluating seismicity of soils at potential reactor sites. To evaluate methods used in all steps of the process of seismicity of a nuclear power plant and determine margins of safety attributable to the various methods used. To validate predictions of structure, system, and component response through testing, where feasible. To provide standards for analytical methods to be used in seismicity of nuclear power plants.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0226. SEISMIC GROUND EFFECTS IN THE NEW THEORIES OF TECTONICS AND EARTH MECHANISM

K. AKI, Mass. Inst. of Technology, School of Science, Cambridge, Massachusetts 02139

The ultimate aim of the proposed research is to determine the maximum seismic motion expected at a given location from available information on the physical conditions of an earthquake fault zone on the basis of latest theories of

on surface motion, and (4) The mechanism of stress concentration before an earthquake occurrence. Study in all of the above mentioned areas will be continued.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0227, INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES

J.E. ISHELL, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

The study described in this report was aimed at better understanding the relationship between design strategy and damage during strong earthquakes, and at the development of improved design strategies.

This is the twelfth in a series of reports covering research supported by the National Science Foundation under Grants GK-27955 and GI-29936, as part of the program for Research Applied to National Needs (RANN).

This study involves the development of a design procedure which allows control of the inelastic response of a building. The story ductility ratios and interstory displacements are used as a measure of this control, as these parameters seem directly related to possible collapse and overall damage in the building as the result of a severe earthquake. The building is reduced to a simple spring-mass model. Various design procedures involving Newmark's inelastic response spectra are used to design the stiffness and resistances of the springs. A dynamic analysis of the design models subjected to artificial earthquake motions is made to determine the effectiveness of the design procedures. Newmark's inelastic spectra are also evaluated. A design procedure is developed which gives control over the average values of interstory displacement and ductility ratio, but the desired uniformity of these parameters is not achieved. It is also concluded that to limit maximum values of parameters inelastic spectra should be made more conservative.

Pub. May 74; 136p., Seismic Design Decision Analysis Report No. 12; Dept. of Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass. 02139 PC \$3.00.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0228, NONLINEAR AND COUPLED SEISMIC EFFECTS

J.M. ROESSET, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

Description: The purpose of this research program is to investigate nonlinear soil effects in soil amplification of earthquake motions and the effects of layering and embedment on soil structure interaction effects. This last effect is particularly significant in the earthquake design of nuclear reactors. Finite element techniques are being used to represent the subsoil and the structure and different boundary conditions to reproduce radiation effects are being compared.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0229, SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

The overall objective of this award is to develop a systematic methodology for making decisions concerning the proper

ing future earthquakes. Working within the constraints imposed by realistic public and private policy, the award will specifically seek: 1. To develop reliable data concerning the tangible costs and benefits of designing for increased seismic resistance. 2. To develop probabilistic models for analyzing and comparing the costs and benefits of various strategies for mitigating the consequences of future earthquakes. 3. To work with engineers, building officials and public bodies to learn how such data and results can be used as a basis for making decisions about seismic design requirements.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0230, METHODOLOGY AND PILOT APPLICATION

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

This is the tenth in a series of reports covering work supported by the National Science Foundation under the program of Research Applied to National Needs (RANN), under NSF Grants GK-27955 and GI-29936.

A shortened description of the methodology and pilot application has already appeared in Report 9. Chapter 4 of this report, dealing with the treatment of seismic risk, will also be released separately as Report 11. Chapter 5 is a summary of the development of the damage probability matrices: a complete description appears in Report 8. This report contains (in chapter 6) a complete mathematical formulation of the methodology, and also (in Chapter 8) the first reporting of the studies using multiattribute decision theory.

The aim is to assemble and process the data necessary for a rational choice of required earthquake design requirements in building codes. Procedures are developed to quantify the risk of earthquake shaking, the likelihood of building damage, and the cost of increasing the required earthquake resistance of buildings. Various measures of effectiveness are considered: cost/benefit with a dollar cost assigned to life loss; acceptable life loss and utility functions incorporating both dollar and life losses. As an illustrative, pilot application, the methodology is applied to the choice of design requirements for multi-story apartment buildings in Boston.

Pub. July 74; 181p., Seismic Design Decision Analyses Report No. 10; Dept. Civil Engineering, Mass. Inst. of Technology, Cambridge, Mass. 02139 PC \$3.00.

Abstract Provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0231, EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS

V.L. STREETER, Univ. of Michigan, School of Engineering, Ann Arbor, Michigan 48106

The primary thrust of this activity is to determine the loadings on the upstream sloping faces in earth dams due to water motion in the reservoir induced by earthquakes, and the development of a mathematical model to calculate the transient pore pressure due to dynamic loading. A one-dimensional model will be formulated, that will guide the development of two and possibly three dimensional lattice work analytic models. Dynamic loadings caused by reservoir water sloshing will also be calculated by the same methods, starting from displacements or velocities of the solid boundaries. The dynamic pore pressures will be combined with the total stresses through out the upstream slope, and the distribution of effective stresses will be calculated. The coupling



contribution of dynamic pore pressure to stability analyses of earth dams

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0232. VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLOGY INVESTIGATIONS - SOILS PHASE)

C. C. CALHOUN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Purpose of study/investigation. To determine causes of major riverbank failures along the lower Mississippi river and to improve criteria for predicting soil conditions and susceptibility to liquefaction-type failures

Approach or plan. Boring logs and gradation data for reaches planned for revetment in the Memphis, Vicksburg, and New Orleans Districts are analyzed and potential susceptibility to liquefaction is predicted. Field surveys of riverbank failures furnished by the three districts are evaluated to determine type of failure (either shear or liquefaction induced flow slide), and previous predictions based on empirical criteria are evaluated

Progress to date. Annual reports were published on data from 1954 to 1968. Starting with the 1968 data, reports will be biennial. The first biennial report, Potamology Investigations Report 12-21, Verification of Empirical Method for Determining Riverbank Stability, 1968 and 1969 Data, is being published. The empirical criteria, modified in 1959, are used to classify fine sands into zone A and zone B, based on gradation, and to predict potential susceptibility to liquefaction if the zone A sand thickness is 20 ft. or more and the ratio of overburden thickness to zone A sand thickness is 0.85 or less. During 1968, the criteria were expanded to include the depth of thalweg for making predictions for locations in the New Orleans District. Since 1954, a total of 103 flow failures have been recorded within 500 ft. of analyzed boring locations, with 91 locations predicted to be susceptible and only 12 locations predicted to be stable. However, many locations predicted to be unstable have not experienced flow failure.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0233. STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT 1.

O.W. NUTTLI, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract. The earthquake risk problem in the Central United States, taken to be approximately the area east of the Rocky Mountains and west of the Appalachians, is discussed. The seismic history of the area is reviewed and is used to divide the area into various seismic regions. A design earthquake, defined as the largest earthquake that can be expected to occur within an area, is specified for each of the three seismic regions. Specification of the design earthquake is accomplished by giving ground displacement, particle velocity, and acceleration values in hard rock as a function of distance from the earthquake, for three particular wave frequencies. The results are presented in graphical and tabular form. A brief discussion of the effects of soil instability is included. The problem is of particular importance in the Mississippi and other major river valleys of the Central United States.

Pub. Jan. 73: 59p., NTIS No. AD-756 447: PC \$4.50 MF

F.C. TOWNSEND, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

To establish criteria evaluating the liquefaction susceptibility of soils under earthquake, blast, wave action, and loadings.

Published case histories of liquefaction failures would be collected, reviewed and evaluated to determine common factors, i.e., soil type, loading conditions, and hydraulic characteristics influencing these failures. Based upon these histories, a laboratory testing program utilizing dynamic monotonic triaxial tests, simple shear or shaking tables, will be conducted to determine common trends contributing to the liquefaction susceptibility of soils. Subsequently, laboratory data would be the basis for a classification and evaluating the liquefaction susceptibility and remedial measures for preventing liquefaction of soils.

Supporting agency address information. OCE Waterways Experiment Station, P. O. Box 631, Vicksburg, MS 39180

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0235. SOME GROUND MOTION AND INTENSITY RELATIONS FOR THE CENTRAL UNITED STATES

A. NECIOGLU, St. Louis University, Graduate School, St. Louis, Missouri 63103

Abstract. Because of low absorption of seismic wave energy in the central United States as compared to the western United States, relations between ground motion and intensity differ in the two regions. This paper presents some empirical relations between magnitude, intensity and perceptibility that are applicable to the central United States. In general, the relations of perceptibility and of damage are one to two orders of magnitude greater for earthquakes in the central area than for western earthquakes of equal magnitude or of equal maximum intensity.

Pub. 1974: 27p., NTIS No. COM-74-10804/4: Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 3.0236. A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE

O.W. NUTTLI, St. Louis University, Graduate School, St. Louis, Missouri 63103

This project is concerned with a study of microearthquake activity in western Tennessee, eastern Arkansas and northern Mississippi. One objective is to determine if there are earthquakes along an extension of the trend of the Madrid Fault System to 34 degrees N, 91 degrees W, and attempt to learn more about the southern limit of this system, and hopefully to delimit it. A second objective is to determine if there is seismic activity along the transverse trending Ouchita Tectonic Front and its westward (Vicksburg Mountain) and eastward (Appalachian Tectonic Front) extensions. The epicentral locations of past felt earthquakes suggest such a trend as being possible, but of themselves are insufficient to establish that this tectonic feature represents an active fault zone.

In addition to the microearthquake study, focal mechanism solutions of earthquakes with Mb greater than 4 (about 100) in the past five years in the Mississippi Valley seismic region will be obtained from the spectra of long-period surface waves, with body-wave data serving as a constraint.

**3.0237, MAGNITUDE - RECURRENCE - RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES**

**O.W. NUTTLI**, St. Louis University, Graduate School, St. Louis, Missouri 63103

**Abstract:** Earthquake magnitudes are estimated for all known felt earthquakes in the central Mississippi River valley seismic region for the interval 1833 through 1972. The resulting data set is examined for completeness, so that an estimate of the average number of earthquakes per year in a given magnitude interval can be determined. The resulting data yield a recurrence equation of the form:  $\log N$  equals  $3.69 - (0.89 \text{ plus or minus } 0.11) \text{ Mb}$ , at the 95% confidence limit, where  $N$  is the number of earthquakes per year occurring in the magnitude interval  $\text{Mb}$  plus or minus 0.2, for 3.3 less than or equal to  $\text{Mb}$  less than or equal to 6.3. Extrapolation of the curve by one  $\text{Mb}$  unit indicates that the return period for an earthquake the size of the three great Mississippi Valley earthquakes of 1811 and 1812 is about 500 years.

Pub. 1974: 38p., NTIS No. COM-74-10814/3: PC \$5.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**3.0238, THE RELATION BETWEEN FELT AREA AND MAGNITUDE FOR CENTRAL UNITED STATES EARTHQUAKES**

**O.W. NUTTLI**, St. Louis University, Graduate School, St. Louis, Missouri 63103

**Abstract:** In general, there is a nearly unique relation between magnitude and felt area of central United States earthquakes. To develop a quantitative relation, 22 recent earthquakes were studied, and an empirical equation was derived. The equation can be used to estimate the magnitude of earthquakes for which there are intensity maps but no instrumental data. From the equation one can determine that the limit of perceptibility corresponds to a sustained, hard rock, vertical-component particle velocity of about 22 micron/sec.

Pub. Feb. 74: 15p., NTIS No. COM-74-10808/5: Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**3.0239, TRAVEL-TIME TABLES FOR EARTHQUAKES IN THE CENTRAL UNITED STATES**

**O.W. NUTTLI**, St. Louis University, School of Engineering, St. Louis, Missouri 63103

**Abstract:** Travel-time tables for earthquakes occurring in the central United States and recorded in central and eastern North America are presented for distances from 0 to 1000 km. The tables are given for focal depths of 0.5, 15, 25 and 35 km.

Pub. Mar. 70: 13p., NTIS No. AD-706 427.

SUPPORTED BY U.S. Dept. of Defense - Air Force

**3.0240, RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI**

**W. STAUDER**, St. Louis University, School of Arts, St. Louis, Missouri 63103

A strain observatory has been installed near Flat River, Missouri, about 70 miles South of Saint Louis. Operation has perfected under previous grants and has been recording high quality earth tidal and earth strain data since November 1969. Near-station micro-earthquake activity is being observed at the rate of about two shocks per day. Secular strain is predominantly an EW compression, accumulating at a rate as great as 10-6 per year.

mid-continent site, to study the micro-earthquake relation to local seismicity, and to continue system of focal mechanisms in regions of significant spreading.

SUPPORTED BY U.S. Nat. Science Foundation

**3.0241, SEISMIC STUDIES - SOUTH CENTRAL EARTHQUAKE OF NOVEMBER 9, 1968**

**B. STAUDER**, St. Louis University, School of Engineering, St. Louis, Missouri 63103

**Abstract:** The largest earthquake to occur in the Mississippi seismic region this century took place in Illinois on November 9, 1968. The hypocenter time based on observations from twelve regional stations varying in epicentral distance from 171 to 37.95N, 88.48W,  $h$  equals 25 km,  $Q$  equals (1 sec) plus or minus 0.2 sec). Travel times of distant less than 2600 km indicate regional magnitudes corresponding to rays bottoming at depths down to 100 km. Beyond this point travel times show a much steeper dependence, if any, on region. For stations in the central United States  $P$  times may be fitted by two straight lines which intersect at about 600 km. The first responds to  $P_n$ , the second to rays refracted at depth 97 km with a velocity below it of 8.1 km/sec. At larger distances (48 - 100 degrees) there are no independent residuals with respect to the Herrin T<sub>0</sub> about 0.25 percent SEC4 indicating a source region with respect to these tables.

Publ Dec 69: 14p., NTIS No. AD-711 260.

SUPPORTED BY U.S. Dept. of Defense - Air Force

**3.0242, MERAMEC PARK LAKE, UPPER MERAMEC RIVER BASIN, MERAMEC RIVER, MISSOURI - UNKNOWN, U.S. Army, Engineer District, St. Louis, Missouri 63120**

**Abstract:** An appendix to the environmental impact study draft for Meramec Park Lake on the Meramec River, Missouri, contains information on area flooding, water wells, soils, flora and fauna taxonomy, wildlife, and aquaculture.

Pub. Apr. 73: 144p., NTIS No. EIS-MO-73-59.25.

SUPPORTED BY U.S. Dept. of Defense - Army

**3.0243, THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUNDWATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COAST PLAIN**

**P.H. JONES**, U.S. Dept. of the Interior, Geological Survey, St. Louis, Missouri

Very large rates of fluid withdrawal from Gulf of Mexico and petroleum reservoirs (more than 2 billion barrels of water, many millions of GPD of salty water, and enormous volumes of natural gas) have resulted in widespread large-scale aquifer water salinity changes, land subsidence, and contamination of fault zones. Effects of oil-field and industrial water disposal through injection wells are unheated, overpressured, low-salinity water in reservoir systems freshening progressively with depth. Freshwater in the Gulf of Mexico is an untapped resource needing intensive study.

To identify, describe, analyze and interpret the features of post-Oligocene deposits of the Gulf of Mexico.

relation of salinity and composition of aquifer waters and the geothermal regime to the sediment facies distribution and geologic structure

Structural and sediment facies distribution maps will be made using data provided by oil companies, supported by geophysical log cross section. Salinity and composition of aquifer waters will be mapped using chemical analyses of produced waters and electric log-derived salinity data. Isothermal maps will be based upon bottom-hole temperature data recorded on geophysical log headings. Computer processing of salinity, temperature, and sediment facies data will speed map preparation and the analysis and interpretation of the hydrology of the deposits.

Data collection, from oil company records, is still the major effort. Compilation, analysis, and mapping of formation-water salinity and temperature, and computer processing of data have resulted in development of new concepts on deep sedimentary basin hydrology. These, together with the basic data going into computer storage, greatly improve our capability to appraise saline ground-water resources, subsurface environments for waste storage, and geothermal resources.

Continuation of data collection, completion of detailed study and interpretative report on the lower Rio Grande embayment (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 3.0244, PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA- GLENDALE AREA

J.R. MURPHY, Environmental Res. Corporation, Las Vegas, Nevada

An analysis of selected aftershocks of the San Fernando earthquake recorded at damage sites in the city of Glendale, California indicates that significant variability in the ground motion spectra occurs within this rather small geographical area. This variability is quantified and used to estimate the main shock ground motion spectra at a number of sites of interest which did not record the main shock.

Pub. Aug. 71: 34p., NTIS No. NVO-1163-TM-30: PC \$3.00 MF \$0.95

SUPPORTED BY No Formal Support Reported

### 3.0245, SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972

K.C. BAYER, U.S. Dept. of Commerce, Earth Sciences Laboratory, Las Vegas, Nevada 89114

A cooperative network of twenty-three seismic velocity stations is operated in the southern Nevada area, the stations are monitored by the NOAA/ESI Nevada Special Projects Party located in Las Vegas, Nevada. Data from the stations are analyzed and programmed through the Computer Sciences Corporation CDC 6400 Computer, also located in Las Vegas. The most significant and active seismic activity was the Silent Canyon Sequence (areas 19 and 20) on the Nevada Test Site. A map showing the principal earthquake and aftershocks is given and discussed. This is the initial seismic bulletin in which the entire data analysis (including the computer programming) has been accomplished in Las Vegas by the Nevada Special Projects Party. The output is listed in the Hypocenter Summary. The listing is the result of data scaled only from the local network and solutions determined by a local epicenter program. A total of 296 epicenters is listed.

Pub. Jul. 72: 27p., NTIS No. NVO-746-3: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Atomic Energy Commission

K.C. BAYER, U.S. Dept. of Commerce, Earth Sciences Laboratory, Las Vegas, Nevada 89114

A cooperative network of twenty seismic stations in the southern Nevada area, the stations are recorded by the NOAA ESL Special Projects Party located in Las Vegas, Nevada. Data from the stations are analyzed by the NOAA Special Projects Party staff, seismic data for the period December 22, 1971 were processed by a CDC 6400 computer. The output is listed in the Hypocenter Summary. The listing includes solutions determined by a local epicenter program and also solutions obtained by the Earthquake Information Center (NEIC). Most of the epicenters are listed. About 250 of these are located within 200 km from Station CPX, which is approximately at the center of the network. Two out of several of their aftershocks were felt in southern Nevada during 1971. Maps showing the epicenters of earthquakes and their aftershocks are given in the Summary.

Pub. May 72: 41p., NTIS No. NVO-746-TM-3: PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0247, ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Las Vegas, Nevada

Preliminary data acquired from an Aleutian network of seismograph stations are presented. These computations are preliminary and may be revised on the basis of current data. The Aleutian hypocenter summary is a listing of earthquakes located with a network of seismographs operated by the Branch of Seismic Engineering, U.S. Geological Survey, western Aleutian Islands. The summary lists the geographic coordinates, and depth of each event.

Pub. Jun. 73: 54p., NTIS No. NVO-746-13: PC \$3.00 MF \$1.45

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0248, DILATANCY AND PREMONITORING OF P, S TRAVEL TIMES

I.N. GUPTA, Univ. of Nevada, School of Mines, Las Vegas, NV 89507

Abstract: Nur's (1972) explanation of the observed frequency decrease in the travel time ratio of shear and compressional waves  $v(P)/v(S)$ , in terms of dilatancy is considered, considering the anisotropic characteristics of dilatancy in the focal region. The expected change in  $v(P)/v(S)$  is influenced by the orientation and type of geologic structure, as the geometry of source and observation point. The wave will in general split into two components traveling at somewhat different velocities.

Pub. Jan. 73: 7p., NTIS No. AD-775 963/2: Reprint \$0.50

SUPPORTED BY U.S. Dept. of Defense - Air Force

### 3.0249, SPECTRAL CHARACTERISTICS AND DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA

A. RYALL, Univ. of Nevada, School of Mines, Las Vegas, NV 89507

Abstract: Frequency and amplitude characteristics of microearthquakes recorded on a local network of three-component seismographs in the Fairview Peak area, Nevada.

## MAJOR DISASTER TYPES

central Nevada. Maximum trace amplitude of the events decreased with focal distance approximately as  $R$  to the minus 1.9 power. Site amplification, by a factor of 2, was observed for the only station not located on rock. Comparison of observed spectra for these events with theoretical spectra given by Brune indicates stress drops ranging from 40 to 600 millibars. Calculated source dimensions and seismic moments for microearthquakes in this area are in agreement with results of earlier studies. When location of the events is considered, the variation in stress drop appears to be related to differences in the faulting mechanisms.

Pub. Sep. 71: 10., NTIS No. AD-738 392: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Air Force

### 3.0250, EARTHQUAKE DISTRIBUTION AND MECHANISM OF FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VALLEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA

A. RYALL, Univ. of Nevada, School of Mines, Reno, Nevada 89507

**Abstract:** The distribution of microearthquakes in west-central Nevada correlates well with fault-plane solutions for this area and defines a zigzag series of crustal fractures that vary in length from a few to several tens of kilometers. The main Fairview fault strikes northwest, and motion on this fault is right-lateral oblique slip. In other parts of the active zone northeast-striking faults have mainly dip-slip motion. Focal mechanisms are generally consistent with an interpretation of simple block faulting, faults of different orientation having the same slip direction. For the Rainbow Mountain and Fairview Peak areas, crustal blocks to the east of the fracture zone move down and southeast with respect to blocks on the west side. Faulting in this region appears to be related to regional extension, acting in the direction N60W-S60E.

Pub. Jun 71: 9., NTIS No. AD-738 393: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Air Force

### 3.0251, PROBABILITY OF FATIGUE FAILURE UNDER EARTHQUAKE LOADS

J. TANG, Univ. of New Mexico, Bureau of Engineering Research, Albuquerque, New Mexico 87106

**Abstract:** Whenever a structure is subjected to strong-motion earthquake excitation, certain parts of the structure may undergo plastic deformations which indicate structural damage. It has also been known that the damage due to repeated applications of plastic deformation is cumulative and could cause low-cycle fatigue failures. It is possible for a structure to experience low-cycle fatigue failure under seismic loads. Studies have been made to determine the responses of structures subjected to earthquake excitation.

Pub. Aug 71: 66P., NTIS No. PB-202 553: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0252, A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING

P.H. WIRSCHING, Univ. of New Mexico, Bureau of Engineering Research, Albuquerque, New Mexico 87106

**Abstract:** The results of a study of techniques for improving the safety of seismic structures are presented. In particular, the effect of passive motion reducing devices on seismic struc-

ture absorber attached to the roof, and a vibrator placed between the ground and the foundation. Various types of devices listed were also investigated. On structural safety, these modified systems are ranked in order of their efficiency as follows: isolator, isolator-absorber-damper, absorber, the damper.

Pub. May 70: 186P., NTIS No. PB-192 693: HC \$0.650

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0253, ADAPTIVE STRUCTURAL SYSTEMS

J.T. YAO, Univ. of New Mexico, Bureau of Engineering Research, Albuquerque, New Mexico 87106

**Abstract:** An 'adaptive' structural system is defined as a structural system, the behavior of which varies automatically in accordance with unpredictable variations in the loading conditions and thereby produced desirable response under all possible loading conditions considered. A practical design of an adaptive structural frame is suggested. More than research problems related to the application of the concept of adaptive structural systems are examined.

Pub. Jun 68: 29p., NTIS No. PB-194 014: HC \$3.00

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0254, SEISMIC DESIGN OF BUILDING STRUCTURES

J.T. YAO, Univ. of New Mexico, Graduate School of Engineering, Albuquerque, New Mexico 87106

**Abstract:** The purpose of this project was to formulate suggestions for improvements in the design codes concerning building structures which are subjected to earthquake loads. In the process, suggestions were made concerning ways to incorporate new concepts and methods of discrete mechanics, statistics, as well as earthquake behavior of concrete structures into the seismic design code. Available data on existing design codes is summarized here. The basic philosophies and methodologies in earthquake engineering were also studied.

Pub. Jul. 72: 154p., NTIS No. AD-751 178: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0255, DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL SYSTEMS

H.Y. YEH, Univ. of New Mexico, Bureau of Engineering Research, Albuquerque, New Mexico 87106

**Abstract:** The responses of single-degree-of-freedom and bilinear systems to earthquake excitations are studied using a CSMP (Continuous System Modeling Program). Those results show that the bilinear system is more effective in resisting earthquake loads than corresponding linear systems. Moreover, a type of two-degree-of-freedom system was studied in a similar manner and the results show that it can be more advantageous to use the bilinear system.

Pub. Jul 68: 28p., NTIS No. PB-198 372: PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0256, COMPILATION OF BRITTLE STRAIN DATA WITHIN NEW YORK STATE

Y.W. ISACHSEN, State Dept. of Education, Albany, New York

Current plans and/or progress. This project should be completed during the course of 1974, incorporating much new linear data from ERTS-1 imagery.

SUPPORTED BY No Formal Support Reported

**3.0257, LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS**

**B.G. JONES**, Cornell University, School of Architecture, Ithaca, New York 14850

This study will attempt to make strides in the improvement of methodology for the spatial planning of regions which are subjected to periodic disasters resulting in extensive reconstruction or construction of the region. Experience has shown that the construction following a natural disaster often includes new high-rise structures. Of interest is development of methodology which will be of use in establishing the consequences of including high-rise structures in the plan for the development of a region in the reconstruction and next period following a disaster. The method to be used involves the use of time series data allowing the recording of the trace of the development path and will allow the comparison of the socio-economic structure with selected comparable regions. Mid-range development objectives will be developed that seem appropriate and realizable in terms of the previous pace of development and levels achieved in comparable nearby regions. The methodology will be tested using data derived from the Banja Luka region of Bosnia, Yugoslavia, which was devastated by an earthquake in 1969.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0258, MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE**

**F.J. GUMPER**, Columbia University, Lamont Doherty Geol. Observ., Palisades, New York 10964

**Abstract:** Microseismicity, composite focal-mechanism solutions, and previously-published focal parameter data are used to determine the current tectonic activity of the prominent zone of seismicity in western Nevada and eastern California, termed the Nevada Seismic Zone. The microseismicity substantially agrees with the historic seismicity and delineates a narrow, major zone of activity that extends from Owens Valley, California, north, past Dixie Valley, Nevada. Focal parameters indicate that a regional pattern of NW-SE tension exists for the western Basin and Range and is now producing crustal extension within the Nevada Seismic Zone.

Pb. Nov. 71: 26p., NTIS No. AD-737 576: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Air Force

**3.0259, MEASUREMENTS FOR FAULT SLIP ON THE DENALI, FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS, ALASKA**

**R. PAGE**, Columbia University, Lamont Doherty Geol. Observ., Palisades, New York 10964

**Abstract:** Geodetic networks with dimensions on the order of 40 meters to 2 km were established across the Denali, Fairweather, and Castle Mountain faults to measure slip by repeated annual triangulation. Within the resolution of the data, slip was not observed on any of the faults; specifically, horizontal and vertical slip, if not zero, was less than 3 mm on the Denali and Fairweather faults for 1967-1969 and 1968-1969, respectively, and less than 5 mm on the Castle Mountain fault for 1966-1969. The Denali and Fairweather faults are less likely to be active than the Castle Mountain fault.

Pb. Sep. 71: 11p., NTIS No. AD-737 576: Reprint.

**3.0260, EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION**

**C.H. SCHOLZ**, Columbia University, Lamont Doherty Geol. Observ., Palisades, New York 10964

This is an extensive experimental and theoretical program directed at the goal of developing a quantitative model of dilatancy and fluid flow for the prediction of earthquakes.

The work will involve laboratory studies of dilatancy at pressure and temperature conditions appropriate to the upper part of the earth's crust, emphasizing detailed measurements of  $v_p$  and  $v_s$ , strains, stresses, pore pressure, and permeability. Combined with the laboratory work will be theoretical studies directed toward developing a quantitative theoretical model of dilatancy and fluid flow to utilize the experimental results and to extend it to earthquake prediction. This work will be interfaced with other work being done at Lamont-Doherty on observational studies of dilatancy prior to earthquakes, such as at Blue Mountain Lake, New York.

Five main phases of work are proposed: (1) Laboratory verification of the dilatancy-fluid flow model for earthquake prediction; (2) Basic research into dilatancy and, in particular, the problems inherent in the present formulation of the model; (3) Development of a theoretical model; (4) Laboratory measurements of the parameters and processes necessary for quantitative application of the model and (5) Application of the above results to observational data for earthquake prediction as such data become available.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0261, SEISMOLOGY AND GLOBAL TECTONICS: A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES**

**L.R. SYKES**, Columbia University, Lamont Doherty Geol. Observ., Palisades, New York 10964

The hypothesis of global tectonics in the next few years will have an important impact on studies of earthquake prediction and of intra-plate tectonics. A farcical program of research directed toward increased fundamental understanding of short-term interactions of lithospheric plates and of evidence from intra-plate tectonics that bears upon the driving mechanism of plate tectonics will be conducted. This increased understanding will be sought by studies of seismicity gaps, regularities in the accumulation and release of seismic energy along major plate boundaries, changes in seismic activity before large earthquakes, intra-plate earthquakes, and patterns of stress distribution within plates as inferred from focal mechanisms and in situ stress measurements. It is also planned to study the precise distribution of large earthquakes and their aftershocks in time and space along several of the major oceanic transform faults. Since these oceanic fracture zones are relatively simple and straight, they offer one of the best opportunities to find regularities in stress propagation along plate boundaries. This work may provide insights for estimating seismic risk for areas like California where the tectonic pattern is also of the transform-fault type.

SUPPORTED BY U.S. Natl. Science Foundation

**3.0262, A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALUTIAN ARC - ALASKA**

**L.R. SYKES**, Columbia University, Lamont Doherty Geol. Observ., Palisades, New York 10964

Island Arc and to evaluate the earthquake risk in that region. The tectonics of the Aleutian arc is investigated within the framework of recent advances in plate tectonics. Research on seismology is emphasized, but information from geology, geodesy, volcanology, geochemistry and marine geology is also considered. Focal mechanism solutions of earthquakes provide information on the pattern of tectonic stresses and relative motion of tectonic blocks. The spatial distribution of earthquakes outline the plate boundaries and the deep earthquakes indicate that the Pacific plate is being underthrust beneath the Bering Sea - Alaska plate to a depth of at most 250 km. Travel times of seismic body waves and dispersion of surface waves show strongly anomalous upper mantle velocities associated with the island arc structure. The study of the historic and recent seismic record allows us to identify zones of high seismic risk for future large and destructive earthquakes. Two telemetered seismic networks are operated. Seismic information from these networks are analyzed to evaluate the possibilities for earthquake prediction in zones of high seismic risk. This study has important implications for understanding risks from volcanoes and seismic sea waves (tsunamis).

**Results:** Operation of 3 seismic stations and 2 telemetered seismic arrays in the Aleutians and Alaska Peninsula. Identification of four zones with high risk for future major earthquakes, one of which has proved to be correctly predicted. Quantitative determination of anomalous seismic-wave velocities in the upper mantle associated with typical island arc structures such as the downgoing slab of Pacific lithosphere and the Island Arc Ridge. Installation of 3 strong-motion seismic accelerometers. Geodetic dry-tilt sites and experimental installation of tiltscopes monitor long-term tectonic deformation of the earth's crust.

**SUPPORTED BY** U.S. Atomic Energy Commission

### 3.0263, TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS

**M. WYSS**, Columbia University, Lamont Doherty Geolog. Observ., Palisades, New York 10964 (14-08-0001-12289)

Detailed study of the focal mechanism and source parameters of specific earthquakes and their aftershock sequence for the purpose of determining in-situ stress by seismic means. Primary emphasis will be placed on determining stress maps for the Eastern U.S. But as far as possible, a stress map will be developed for the entire U.S. by integrating early results for the Western U.S. Stress calculations will be compared with in-situ stress measurements at Denver Arsenal and Rangely Oil Field.

Using seismological data from existing stations, the seismic moment, total recorded energy, and the corner frequency will be measured. These parameters will be used to calculate estimates of source dimensions, amount of fault slip, stress drop, and a lower bound on the total stress in the source region.

Supporting agency address information: Defense Advanced Research Projects Agency, Arlington, Va. 22209

**SUPPORTED BY** U.S. Dept. of Defense - D.A.R.P.A.

### 3.0264, AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA

**R.S. YEATS**, Ohio University, School of Arts, Athens, Ohio 45701

principally on subsurface well data obtained in the search for, and the production of oil and gas. The region underwent virtually continuous sedimentation during and following the imposition of the north-south compressional stress field that dominates it today. Over 1,000 well logs are being used in the study, providing the opportunity for three-dimensional analysis unique in the Transverse Ranges; other information concerning anomalous fluid pressures, nonplanar oil-water interfaces, and geothermal gradients are also being used. The first year of the study concentrated on the Oak Ridge high-angle-reverse fault.

The investigation will be extended to the Red Mountain, San Cayetano, and Santa Susana faults and the tectonically over-pressured Ventura Avenue anticline. After cross-sections and contour maps are constructed for these individual structures, regional stress trajectory cross sections and maps showing displacement vectors and strain rate changes parallel to strike will be constructed using computer analysis and display; this is expected to shed light on fundamental problems of the mechanics of thrust faulting in a seismically active region.

**SUPPORTED BY** U.S. Natl. Science Foundation

### 3.0265, SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS

**E.C. RODABAUGH**, Battelle Memorial Institute, Columbus, Ohio 43201

A summary of design practices, service experience, and research work on the structural design of piping components and systems is presented to provide a background and direction for future work. The analysis is restricted to structural design aspects of metal piping systems. The information is presented in chapters on factors involved in structural design, analytical methods, failures, standards, straight pipe welds, curved pipes and miters, connections, reducers, valves and pumps, supporting elements, thermal stresses, and dynamic effects.

**Pub.** Dec. 70: 561p., NTIS No. TID-25553: PC \$6.00 MF \$0.95.

**SUPPORTED BY** U.S. Atomic Energy Commission

### 3.0266, SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970

**H.R. BLANK**, Univ. of Oregon, School of Liberal Arts, Eugene, Oregon 97401

A study is reported of seismicity in the Cascade Mountains and vicinity, Oregon, a Cenozoic volcanic region of diverse structural and lithologic aspects which offers an array of terrestrial analogs to lunar and planetary volcanic terrains. Specific objectives of the program included 1) installation and operation of a seismic station at the suitable site on Pine Mountain in central Oregon; 2) design and fabrication of an ultra portable seismic system for the detection of microearthquakes; 3) determination of absolute and relative seismicities of major Cascades volcanoes by means of reconnaissance microearthquake surveys and 4) comparison of seismicity levels in the High Cascades with seismicity levels in adjacent volcanic provinces.

**Pub.** Jul 70: 32p., NTIS No. N70-32970: HC \$3.00 MF \$0.65.

**SUPPORTED BY** U.S. Natl. Aero. & Space Adm.

3.0268.

**Abstract.** Presents information on the geology of the project area. Gives information on reservoir slope stability, seismicity, and possible effects of earthquakes on the reservoir.

Pub. Oct. 72: 12p., NTIS No. EIS-OR-72-4666-F-S. PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### 3.0268, SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES

**B.F. HOWELL**, Penn. State University, School of Earth Sciences, University Park, Pennsylvania 16802

The past history of earthquakes of intensity V and larger, in North America between 30 degrees 50 degrees N latitude will be studied to evaluate to what degree the past history can be used to predict the future hazard from earthquakes. A pilot experiment using only 88 moderate and large earthquakes in the eastern half of the area suggests that past occurrences fail to delineate clearly the relative hazard for areas less than 10 degrees on a side.

Using procedures developed in the pilot experiment, evaluations will be made of the precision to which the seismic hazard can be estimated in areas 1 degree, 2 degrees, 4 degrees, 5 degrees, and 10 degrees on a side. These will be based on: A. the extent to which large earthquakes tend to occur in areas where small earthquakes are also common; B. the degree to which there have been small earthquakes previous to the largest earthquake in an area; and C. the correlation of the spatial occurrence of events on odd dates with those on even dates. Allowance will be made for different attenuation of intensity with distance from the epicenter in the eastern and western parts of North America.

Based on these studies, maps of relative hazard for the region will be prepared using a quantitative measure of the expectable hazard, subdividing the country into regions of similar tectonic characteristics.

The probability that the locus of most probable seismic risk tends to move about, causing a temporary decrease in hazard after a very large earthquake, will be tested.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0269, EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE

**F. KELLOGG**, Mississippi Ark. Tenn. Council, Memphis, Tennessee

**Abstract:** This report summarizes progress on a study of the earthquake risk in Crittenden County, Arkansas, DeSoto County, Mississippi, and Shelby County, Tennessee. The study is designed to set up a decision model usable by officials in this and other areas for the purpose of adopting building code policies furnishing appropriate earthquake protection where damage could be great but frequency of damage is small. The geological conditions and physical properties of rocks and soils germane to this objective are presented, construction has been classified according to use, height, design and foundation type and dollar volumes for the area have been estimated for the years 1970, 1980, 1995, and 2020. Desirable additional work has been indicated.

Pub. May 73: 121p., NTIS No. PB-223 087/8: PC \$8.25 MF \$1.45.

**UNKNOWN**, Mississippi Ark. Tenn. Council, Memphis, Tennessee

**Abstract:** The report covers the development to date of basic parameters required to evaluate the earthquake risk of the MATCOG area. Consideration has been given to the seismic history and the geotectonics of the Missouri, Arkansas, Kentucky, Tennessee, Mississippi area. Earthquake motion data from California and other U.S. areas were assembled, evaluated and summarized for applicability to the central United States. A methodology is included for the attenuation of earthquake intensity with distance. Information on damages experienced in quakes of different intensities and the insurance industry practices are reviewed pursuant to the making of future damage estimates.

Pub. May 73: 190p., NTIS No. PB-223 186/8: PC \$11.50 MF \$1.45

SUPPORTED BY No Formal Support Reported

### 3.0271, DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS

**R.M. HOLMES**, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830

Dynor is a computer program that was developed to analyze the response of structural systems to the vibratory ground motion of earthquakes as well as sinusoidal motion. This program can be applied to structural systems that can be mathematically idealized with beam-type elements which have no more than three degrees of freedom per joint. The input for the earthquake vibratory motion may be either time history or response-spectrum data. The program is written in FORTRAN IV language, and it is operable on the IBM 360-91 computer at Oak Ridge National Laboratory. The supporting theory and procedures are described and detailed instructions for the use of DYNOR are presented herein.

Pub. Jul. 73: 89p., NTIS No. ORNL-TM-4275: PC \$6.50 MF \$1.45.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0272, EARTHQUAKES INDUCED BY UNDERGROUND FLUID INJECTION

**B.C. MCCLAIN**, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830

In 1966, an unusual series of earthquakes near Denver, Colorado were correlated with deep well waste disposal operations at the Rocky Mountain Arsenal. Since that time, additional investigations have confirmed the postulated cause-and-effect relationship and have established the mechanisms responsible. Because of this experience, various questions have been raised about the possibility of a similar occurrence related to ORNL's hydraulic fracturing waste disposal practices. The mechanisms of the Denver earthquake sequence are examined in detail and the conditions necessary for such a phenomena determined. These conditions are so stringent that only in very rare occasions are they approached in normal industrial or oil field deep well disposal operations. By applying these necessary conditions to the situation existing at the Oak Ridge site, it can be unequivocally demonstrated that hydraulic fracturing operations cannot result in earthquakes by the mechanism responsible at Denver.

Pub. Oct. 70: 17p., NTIS No. ORNL-TM-3154: PC \$3.00 MF \$0.95

This research will be an experimental investigation of the influence of shape and embedment on the dynamic response of foundation - soil systems. Circular and noncircular (rectangular) model footings will be used which will be cast-in-place concrete footings. Transient vertical, torsional, and rocking and sliding motions of these footings will be studied for surface and embedded models. From the surface investigation, equivalency factors relating the response of noncircular footings to the response of circular footings will be determined in all three modes of vibration. The embedded model investigation will be conducted with footings of the same size as those used in the surface investigation but with varying depths of embedment. The embedded models will be tested initially as cast-in-place footings, next with the soil contract along the embedded depth removed, and finally with backfill placed around them. In this manner, the influence of embedment on the response of circular and noncircular footings in all three modes of vibration will be evaluated. These results will be of value in predicting the response of foundations to dynamic loads and in analyzing the response of structures to seismic disturbances.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0274, THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE

H.Y. YEH, Texas A & M University System, School of Engineering, Prairie View, Texas 77445

**Abstract:** The cumulative damage of aluminium alloys with different yield strength and various ductility due to seismic loads was studied. The responses of an idealized beam with a centered mass at one end and fixed at the other end to El Centro's and Taft's earthquakes are computed by assuming that the alloys are perfectly elastoplastic materials and by using numerical technique. Consequently, the corresponding residual plastic strain can be obtained from the stress-strain relationship. The revised Palmgren-Miner cumulative damage theorem is utilized to calculate the fatigue damage. The numerical results show that in certain cases, the high ductility materials are more resistant to seismic loads than the high yield strength materials. The results also show that if a structure collapses during the earthquake, the collapse always occurs in the very early stage.

Pub. Feb 73. 36p., NTIS No. N73-26916/9; PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

### 3.0275, SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HEBGEN LAKE REGION

R.B. SMITH, Univ. of Utah, School of Mines, Salt Lake City, Utah 84112

**Abstract:** In order to relate the seismic activity of the Yellowstone Park-Hebgen Lake area to the regional tectonics, detailed microearthquake monitoring was undertaken during the summer of 1972 to identify the local seismic patterns, and to determine the local stress distribution from fault plane solutions. Also a study of the possible correlation of earthquake swarms to geothermal features was conducted in the Norris Geyser Basin and in the Upper and Lower Geyser Basins.

Pub. May 73: 76p., NTIS No. COM-74-10591/7; PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

S.H. WARD, Univ. of Utah, School of Mines, Salt Lake City, Utah 84112

The proposed research is to study the regional seismic tectonics of the southern Intermountain Seismic Belt with emphasis on the Wasatch Front. To study the seismicity, new high-gain stations would be added to the regional network in Utah by removing ten vertical seismometers from the Uinta Basin Seismological Observatory (UBO) and re-installing them along the Wasatch fault zone and other seismically active fault zones (Sevier-Tushar, East of Hurricane) in Utah along the southern Intermountain Seismic Belt. This improved network would permit (1) determination of hypocenters, (2) an enhancement of mechanism investigations, (3) array analysis for crustal structure, (4) improvement in earthquake prediction and (5) better correlation with strain and tilt data obtained from the Granite Mountain Records Vault (GMU). The seismicity would be telemetered along telephone lines and linked to the University of Utah campus in Salt Lake City.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0277, SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION

G.A. BOLLINGER, Virginia Polytechnic Institute, School of Arts, Blacksburg, Virginia 24061

The objective of the proposed research is to continue studies in the Appalachian seismic zone and to correlate data and results generated to the geology and tectonics of the region. Focal depths and focal mechanism solutions correlatable with regional geology and tectonics, are needed in the Appalachian region. In addition to the extremely fundamental relation of seismicity data to geological sciences, the population density of the region warrants a much more detailed description of seismicity and characteristics than currently exists.

Three additional studies have been shown by the work accomplished thus far to be necessary for continued studies. These studies are: (1) Development of a local magnitude scale based on the Lg phase in the Southeastern United States, (2) micro-earthquake studies of aftershock sequences, the spatial and temporal patterns in the Appalachian seismic regime, (3) Determination of the upper crustal seismic velocities and propagation characteristics.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0278, SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS

UNKNOWN, Shannon & Wilson Incorporated, Berkeley, Washington

No summary has been provided to the Smithsonian Environmental Information Exchange.

Pub. Jan. 72: 394p., NTIS No. TID-25953; PC \$4.00 MF \$0.95.

SUPPORTED BY U.S. Atomic Energy Commission

### 3.0279, DYNAMIC STABILITY OF EARTH STRUCTURES

R.C. BOSTROM, Univ. of Washington, School of Earth Sciences, Washington 98105

This program is being undertaken to investigate the properties of soils and soil liquefaction. Special emphasis will be given to the interpretation of dynamic soils tests which involve the determination of the planar as well as the variations of accelerations in a soil mass compared with the theoretical elasticity solution assuming a completely elastic soil.



3.0280,

tion characteristics of both granular solid (at different densities) and cohesive soils (at several moisture contents).

Studies will be undertaken for both deterministic and random excitations

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0280, A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK

R.S. CROSSON, Univ. of Washington, School of Arts, Seattle, Washington 98105

Seismicity in the Puget Sound region of western Washington has been under investigation using a seismic telemetry array since mid-1969. Earthquakes as small as magnitude 1 can be located in the southern part of the basin and a definite pattern of hypocenters has emerged during a one-year observation period. Initial analysis indicates that the upper mantle velocity is low, at 7.8 km/sec. Most foci are between 15 and 30 km in depth. The Cascade range is seismically active along its west margin, but exhibits little seismicity in its core.

The focal mechanisms of local earthquakes are consistent with N-S compression. Work is in progress on a method of inverting for crustal structure using local earthquake data, on the study of P wave travel-time, amplitude and frequency anomalies, and on the study of crust and mantle velocities from regional earthquakes recorded with the array.

Research on seismicity and structure, and their accompanying tectonic implications will be extended by the addition of 2 stations to the present array in the critical region to the north.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0281, BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN

B. GONEN, Univ. of Washington, School of Engineering, Seattle, Washington 98105

This report presents a historical record of the character and the effects on structures of the two most recent major earthquakes (1949 and 1965) in the Puget Sound area, outlines the history and current state of building-code provisions for earthquakes in the Puget Sound area, and discusses possible regional activities that could aid materially in reducing damage during future earthquakes in the Puget Sound region. The aim of this report is to provide a reference source of regional information relevant for earthquake-resistant buildings in the Puget Sound Basin. Since structural effects cannot be dissociated from ground effects, this study briefly examines soil, geological and seismological effects for the Basin.

The 1949 earthquake is discussed in Chapter 2 and the 1965 earthquake in Chapter 3. The history of building codes and changes in building-code ordinances for earthquake design within the Puget Sound region for the period from 1946 through 1973 are reviewed in Chapter 4. The future for earthquake resistant design is discussed in Chapter 5.

Pub. May 74, 146pp., Report SM-74-1, Div. of Structural

This program will study the strength and behavior of slab-to-column and slab-to-wall connections under seismic loading. Tests will be made on specimens representative of connections to both interior and exterior columns and walls. They will be subjected to statically applied, reversed cyclic loadings having increasing ductility demands. The tests will be conducted in three stages. In the first stage the reinforcement details necessary to ensure ductility and the maintenance of adequate ultimate capacity will be determined for connections to square interior columns. In the second stage these details will be determined for columns with rectangularities approaching those for walls and for specimens simulating both interior and exterior connections. In the third stage the effects of co-existing in-plane shear forces will be examined. An analytic program will support the experimental activity. Once the moment-rotation characteristics for different types of connections at different locations are obtained experimentally, available finite element computer programs will be used to determine the theoretical responses under seismic loading of typical structures incorporating flat plate framing either acting alone or in combination with shear walls.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0283, SEISMIC ACTIVITY OF THE CASCADE VOLCANOES

S.W. SMITH, Univ. of Washington, School of Arts, Seattle, Washington 98105

Earthquakes directly associated with volcanoes are several basic types. One type is indistinguishable from ordinary tectonic earthquakes produced by faulting. These are usually scattered around the volcano with focal depths of 1-20 kilometers. A second type is the volcanic, or type W earthquake which is usually located at a shallow depth near the volcano's summit. The envelope of such an event consists of an emergent arrival and a more gradual decrease in amplitude. The mechanism for these events has never been adequately explained. Both of these types of volcanic earthquakes have been observed on several volcanoes in the Cascade Mountains of Washington. A seismic array will be deployed high on Mt. St. Helens and/or Mt. Rainier to record type B events near their source in order that their mechanism can be studied and better understood.

SUPPORTED BY U.S. Natl. Science Foundation

### 3.0284, DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING

UNKNOWN, Unknown Inst. or Indiv. Grant, Wyoming

This report provides guidance to community planners and decision-makers facing subsidence problems over abandoned mines. It is based upon the findings, results, and conclusions of the demonstration project carried out by the City of Rock Springs, Wyoming in October 1970. The aims of the project were: Demonstrate the feasibility of backfilling underground mine voids for the prevention and alleviation of surface subsidence by a process developed by Dowell, a division of Dow Chemical Company. Assess the local effects of surface

## 4. EXPANSIVE SOILS

## DISASTER MITIGATION

## 4.0001, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, &amp; COSTS OF GEOLOGIC HAZARDS &amp; RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines &amp; Geology, Sacramento, California 95814

Abstract: This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5. PC \$7.75 MF 1.45.

SUPPORTED BY U.S. Dept. of Housing &amp; Urban Development

## 4.0002, INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV)

L.D. JOHNSON, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

To determine the influence of negative pore pressure in desiccated clay soils on subsoil volume changes which adversely affect the behavior of building foundations in swelling clay soils. This study is relevant to maintenance and operation of military structures founded on expansive clays

Equipment will be designed and constructed for the measurement of negative pore water pressure in partly saturated soils under simulated in situ overburden pressures. The negative pore water pressures of selected expansive clays will be determined by the pressure plate technique to evaluate the heave characteristics of foundation soils.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg, MI. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

## 4.0003, REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS

L.D. JOHNSON, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: Differential heave from moisture absorption of expansive clay foundation subsoils has been the source of considerable damage to numerous man-made structures around the world. The amount of heave actually observed is dependent on many factors, particularly climatic conditions, moisture content of the soil immediately prior to placement of the structure, and amount and type of the foundation clay. The most expansive types of soil are those that contain calcium and, especially, sodium montmorillonite minerals. The

face tension forces and occurs only in partially saturated soils. The procedure for construction on expansive foundation subsoils begins with a design study of the site to determine the characteristics of the soil. Once these are known, the soil can be stabilized to minimize foundation heave or, if this proves impractical, the structure can be designed to withstand the expected heave.

Pub. Jun 69: 59p., NTIS No. AD-709 583: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Army

## HAZARD REDUCTION

## 4.0004, GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA

J.M. CATTERMOLE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: South Dakota.

The Rapid City project is a general geology and engineering geology study of a rapidly growing urban area. Three quadrangles, Rapid City West, Rapid City East, and Rapid City NW, have been mapped geologically at a scale of 1:24,000. The maps of the Rapid City West and Rapid City East have been published in the Geologic Quadrangle Map Series in full color with a columnar section and text; the map of the Rapid City NW quadrangle was scheduled to be printed in 1973 and should be released early in 1974.

The final product of the project is a two part Bulletin covering the entire urban area of Rapid City: the first part will describe the geology, structure and stratigraphy of the three quadrangles; the second part will detail foundation conditions, expansive soils, construction materials, landslides, and physical characteristics of each formation and the pertinent effects related to planning engineering projects.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

## 4.0005, DENVER URBAN CORRIDOR STUDIES - COLORADO

W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

Project intends to derive maximum possible geotechnical information from existing available data, supplemented by areal, engineering geologic, hydrogeologic, geochemical, and geophysical studies. Geotechnical maps will be prepared at scales ranging from 1:125,000 to 1:24,000. Project covers virtually all the rapidly urbanizing area at the foot of the Front Range, and the rural areas between, from Fort Collins on the north to Colorado Springs on the south--a distance of about 120 miles, in a belt 40 miles wide extending from the foothills east across the Colorado piedmont. This is one of the fastest growing regions in the Nation. It contains a broad spectrum of geotechnical problems, such as swelling and subsiding foundation soils related to clayey and loessial substrates, declining artesian water pressures, shallow and rising water tables, increasing urban runoff, surface- and ground-water pollution, unstable slopes (landslides), declining gravel resources, urban sprawl across varied geologic terranes, solid waste disposal problems, and general environmental degradation.

The Juneau project started as part of a coastal communities program of earthquake hazard studies following the March 1964 Alaska earthquake. The original primary objective was to investigate and evaluate potential hazards from earthquakes as a result of the geologic setting. The study has been broadened to include other natural geologic events and to try and relate man's use of the land to the existing geologic environmental conditions. Field mapping was completed in 1971.

The project consists of differentiating and mapping surficial deposits and performing physical properties tests on selected samples. Development of raised marine and glaciomarine deposits, glaciofluvial, glacial, and lacustrine deposits is coupled to the geologic history, which in part influences the different physical properties inherent in the materials. The availability and utilization of this information can help the planning and execution of urban expansion and industrial development to hopefully avoid geologic pitfalls by taking into account the geologic influence on the environment, such as relative stability of deposits in case of severe earthquakes, areas of known or potential rockfalls and avalanches, and differing foundation conditions.

A geologic map with text and interpretive transparent overlays was released to open file in May 1972. A U.S. Geological Survey Bulletin, 1394-C, was published in 1973 that gave the glaciomarine deposits a formation name, the Gastineau Channel Formation. A geologic map with tabular text is being processed for publication in the Miscellaneous Geologic Investigations Map series of the Geological Survey.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 4.0007, STABILIZATION OF EXPANSIVE CLAYS AND SHALES

R.D. RICHMOND, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

More knowledge is needed of treatments and construction procedures to economically stabilize expansive soils and soft rock to prevent damage to overlying structures. Various methods such as replacement or treatment with lime are available; however, these are costly and not practicable for deep foundations. The need for new methods was recently emphasized by a matrix team which investigated the damage from differential heaving at Fort Thompson Substation location on Pierre shale in South Dakota.

A review of pertinent investigations by others was completed. Various chemicals and stabilizers such as lime are being investigated in the laboratory. Promising methods in the laboratory can then be tried on a field scale.

Laboratory tests are in progress on lime-clay mixtures to evaluate (1) the effect of temperature changes on curing time and (2) the effect of curing time on the densification of stabilized soils under field conditions.

Laboratory and field tests are also planned for in situ shales utilizing electro chemical stabilizers.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

#### 4.0008, UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS

D. RICHARD, Univ. of Denver, Graduate School, Denver, Colorado 80210

This workshop will attempt to summarize the state-of-the-art and critical areas needing research in the area of the

estimated at 2 million dollars per year in a recent National Engineering Magazine article.

The workshop will consist of general discussions and five specific areas of interest as follows: 1. Pavements - highways, roads, streets, airports and parking facilities. 2. Light Buildings - residential buildings, schools, light commercial buildings, etc. 3. Heavy Buildings - single and multistory industrial and commercial buildings, power and pumping plants, etc. 4. Other Facilities Problems - buried utilities, canals, large pipelines, dams, landslides, etc. 5. Organization, planning and financing for accomplishing general objectives, as related to Workshop findings. Coordination, liaison and technical input to assigned groups.

SUPPORTED BY U.S. Natl. Science Foundation

#### 4.0009, MAPPING OF SURFACE MATERIALS FOR PREDICTING FOUNDATION CHARACTERISTICS IN FUTURE DEVELOPMENT OF HATTIESBURG

B.W. BROWN, Univ. of Southern Mississippi, School of Science, Hattiesburg, Mississippi 39401

An evaluation of shallow surface materials and x-ray identification of clay minerals present in order to delineate areas where expanding type clays create foundation problems.

SUPPORTED BY University of Southern Miss - Hattiesburg

## 5. FOREST & GRASS FIRES

### PUBLIC ASSISTANCE

#### 5.0001, PROFILING THE FOREST INCENDIARIST: AN ANALYSIS OF DOCUMENTED CASE HISTORIES

J.E. DUNKELBERGER, Auburn University, Agricultural Experiment Sta., Auburn, Alabama 36830 (AI A 01-0049)

Objective: Describe personal and social characteristics of selected persons against whom fire trespass cases were initiated by U. S. Forest Service, Region 8, 1960-72; compare characteristics of incendiaries with those of other fire trespassers against whom cases were initiated during same period; develop guidelines for identifying and deterring the actions of potential fire starters.

Approach: Information to be obtained from 'Fire Trespass Reports' (U.S.F.S., Forms 5100-29, 5300-1, and 5300-2) filed during the years 1960-72 involving fires in national forests in Ala., Ga., La., Miss., S. Car., and Tenn.; and interviews with local fire investigators. Malicious incendiary cases will be reviewed and analyzed. Between 75-100 cases are anticipated. A comparable number of non-incendiary (accidental) cases from each geographic area and year will be obtained. Because of large numbers of non-incendiary cases in relation to incendiary cases, minimal information (name, occupation, address and reputation) about the offender will be obtained for a random 50% sample. Data will be analyzed quantitatively for different types of cases and qualitatively as case studies.

Progress: Data for Alabama, Mississippi, Georgia, Tennessee, Louisiana and South Carolina over a period of years have been collected with some exceptions. In total 74 individuals have been identified as involved in malicious woods burning. Information from U.S. Forest Service forms has been obtained on forest fires. Other sources of information provided information on characteristics of fire setters. Observations

who are known to or are believed to have set fire to forests. Data are being organized, classified, and analyzed.

SUPPORTED BY Alabama State Government - Montgomery

#### 5.0002, PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST

A.W. LINDENMUTH, Northern Ariz. University, U.S.D.A. Rky. Mtn. Forest Sta., Flagstaff, Arizona 86003 (RM2102)

Objective: Determine fire intensities that will accomplish management objectives, and develop prescriptions for fires that will attain the desired intensity.

Approach: Determine the natural characteristics and conditions of fuels that influence fire intensity, and how much. Determine what fuel modification treatments are required to alter natural characteristics and conditions of fuel and thereby possibly alter fire intensity. Determine the characteristics and conditions of weather and topography that influence fire intensity, and how much. Determine patterns of ignition that influence fire intensity under different combinations of fuel characteristics, conditions and winds. Determine fire intensities that are effective for doing specific jobs. Determine operational systems for using fire efficiently for doing specific jobs.

Progress: Fuel Chemistry: A chemical coefficient based on phosphate content of leaves has been built into the Arizona oak-chaparral fire spread model. The multiplying factor can increase spread estimates by more than 250 percent, and is in close agreement with both laboratory and field experimental data. Spatial and chronologic sampling oak foliage shows a notable sine wave relationship between phosphate content, leaf age, and physiological condition. Leaf age dates from beginning of the flush of new leaf growth which may come anytime from early April until late August, and in rare years not at all. Variations in foliar phosphate content appear to be caused primarily by translocation within plants. A predicting model is underway. Evergreen Brush Combustion: Conceptual and stochastic fire spread models available do not operate satisfactorily in Arizona oak-chaparral. A new statistical model has been developed directly from research fire data and accounts for more than 80 percent of variation in rate of spread of research fires. The model has been compared with data from larger research fires with satisfactory results. As rate of spread is not an adequate index of fire behavior for management, statistical models for fire intensity, fuel consumption, flame characteristics, fuel temperature, and fuel moisture are being processed for operational use.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0003, PHYSICAL CHARACTERISTICS OF CHAMISE AS A WILDLAND FUEL - CALIFORNIA

C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: Chamise shrubs in southern California were analyzed for the physical characteristics known to affect fire behavior, such as density, fuel loading, and fuel bed porosity. Considerable variation was found, but results are helpful in developing estimates of chamise fuel characteristics for fire control under field conditions.

Pub. 1970: 20p., NTIS No. PB-207 832: MF \$0.95.

Abstract: In the 1968 Canyon Fire in southern California, a fire flareup fatally burned seven Los Angeles firefighters and their foreman. A fire whirl that triggered the flareup appeared to have been caused by a sudden local increase in wind speed-or other disturbance in the airflow. A situation conducive to sudden flareups was produced by fluctuating winds combined with unstable atmospheric conditions and a high fire danger index.

Pub. 1969: 25p., NTIS No. PB-193 694: MF \$0.65.

SUPPORTED BY U.S. Dept. of Agriculture

#### 5.0005, GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA MIXED-CONIFER TYPE

L.R. GREEN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: Fuel modification has been proposed as an answer to California's wildfire problems. But practical consideration limits treatment of fuels to strategically located wide strips or blocks of land called fuel-breaks. Fuel-breaks have a low-growing ground cover that offers less resistance to fire control efforts, and they provide safe access for firefighting forces on the ground. Guides for the construction and maintenance of fuel-breaks are outlined.

Pub. 1971: 18p., NTIS No. PB-207 873: MF \$0.95.

SUPPORTED BY U.S. Dept. of Agriculture

#### 5.0006, FOREST FIRE BEHAVIOR - CALIFORNIA

C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Expt. Sta., Riverside, California 92507

Objective: Identify and define specific predictors of dangerous or unusual forest fire behavior and incorporate these predictors into practical guidelines for fire-fighting and fire use activities.

Approach: Develop new fire behavior concepts and theories to improve the safety and efficiency of firefighting and prescribed fire operations. Identify in the forest environment the most important predictors of dangerous or unusual forest fire behavior by studying the behavior of forest fires, and by assimilation of data from basic laboratory studies such as fire physics and combustion research. Formulate practical fire behavior guidelines to enable fire managers to control wildfires safely and conduct prescribed burning operations efficiently.

Progress: Major physical characteristics affecting fire behavior have been determined for three California fuel species--red shank, deer brush, and manzanita. Fuel moisture boundary conditions for ignition of thin layers of grass fuel by cigarettes have been determined for one wind speed and air temperature. Manuscripts for publications to be used in training of firefighting personnel in radiative heat transfer and its effects on fire behavior and fire control have been prepared, and on the principles and applications of fire danger rating have been prepared. A manuscript describing the conflagration fire problem in southern California and suggesting a solution has been prepared. A paper describing Project Flambeau, summarizing its results, and indicating the further research needed in mass fire in urban and wildland areas has been prepared.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

menting new principles into existing and new fire planning systems, and improve efficiency of fire planning and firefighting operations.

**Approach:** Develop new fire planning principles, develop methods for evaluating the incommensurable and intangible forest values at stake, develop computerized information systems to assist fire managers in applying advance systems analyses techniques to complex fire control problems, and develop more efficient firefighting tactics for potentially dangerous fires.

**Progress:** Portions of a large-scale computer simulation model are being completed or refined while other phases have just been started. Second version of initial attack model capable of handling multiple fires and integrate air and ground attack, including air tankers, has been completed and is being tested. Work started on reinforcement action version that will integrate efforts of cooperators and non-fire personnel and equipment. Data base is largely completed, and a coordinate digitizer has been put into operation. Most digitizer software has been written. Transportation systems for eight national forests are largely completed. Aerial data, such as lookout seen areas and fuel type areas, are now being digitized. Detection portion of the model has been started. The first version compares lookout seen areas to fire occurrence patterns and determines the potential effectiveness of the lookouts in order of their performance. Some work has started in coordinating with aircraft patrol observations. The system that simulates location, time, and series length of multiple lightning fires has been completed. Work has started on the simulated patterns of man-caused fires. A study to evaluate the cost of candidate fire protection plans is eighty percent complete. Cost model considers the financing of the plan as a stream of fixed and variable costs over time. Plans are discounted to present worth.

**SUPPORTED BY** U.S. Dept. of Agriculture - F.S.

#### 5.0008, CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH

*N.T. GRISAMORE, Natl. Acad. of Sciences, Washington, District of Columbia 20037 (NSF-C-310-086-011)*

Partial support is provided for the Committee on Fire Research that was formed in 1955 to advise and consult on the development and conduct of a research program directed at an understanding of the spread and control of conflagrations of the fire storm and forest varieties. In recent years the interest has been increasingly directed toward prevention and suppression of urban fires, and those occurring at the interface of wild lands and metropolitan areas. The Committee will publish three numbers of 'Fire Research Abstracts and Reviews,' publish and distribute the Seventh Edition of 'Directory of Fire Research in the United States.' Two symposia are planned: (1) toxicological problems caused by smoke and (2) pollution problems caused by smoke due to urban and forest fires. The Committee will continue its basic mission of advice, recommendation, and persuasion leading to the identification and solution of real fire problems.

**SUPPORTED BY** U.S. Natl. Science Foundation

#### 5.0009, EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (AB-BREV)

*UNKNOWN, Natl. Acad. of Sciences, Washington, District of*

Forest fire attacks, Helicopter fire fighting in Viet Nam, Aircraft and facilities (Helicopter accessories for fire fighting, Manufacturers specifications and aircraft performance, Helicopter flight restriction and line service operations, Communications are essential, Operation and safety problems, Strategy and tactics in an attack (Integrating an attack with fire-fighting strategy, Fire fighting chemicals, Diversified helicopter services, Current techniques employed by USMC helicopters in crash fire operations, Fire intelligence, General summary and development), Helicopter display and flight demonstration by manufacturers.

*Pub. 1971; 147p., NTHS No. AD 734 078 PC \$4.00 MF \$0.95*

**SUPPORTED BY** Natl. Academy of Sciences - Washington

#### 5.0010, A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I SUMMARY MAIN STUDY RECOMMENDATIONS AND FINDINGS

*UNKNOWN, U.S. Dept. of Agriculture, Div. of Administrative Mgmt., Washington, District of Columbia 20250*

**Abstract:** The objectives of the Forest Service Telecommunications study were to: (1) Evaluate the management of the radio system needed to satisfy the communication requirements of present and future Forest Service programs; (2) Provide methodologies and recommendations for evaluating requirements, financing procedures and organizational structure for electronics and communications management taking into account alternative non-radio communication systems; (3) Provide solutions to some critical large fire communication problems.

*Pub. Nov. 72; 46p., NTHS No. PB 225 182/5 PC \$4.50 MF \$1.45*

**SUPPORTED BY** U.S. Dept. of Agriculture

#### 5.0011, DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS

*R.B. JOHANSEN, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Macon, Georgia 31202 (SE-2102)*

**Objective:** Evaluate new or improved firefighting techniques, tools, equipment, and chemicals for southern forests.

**Approach:** Seek out and perfect new approaches to fire control by analyzing existing fire control techniques. Evaluate findings from national projects (equipment development, fire detection, operations research, firefighting methods, fire danger rating, and chemical retardants) for use under southern conditions. Evaluate firefighting chemicals in three phases: developing a measurement method for rating formulations; determining application rates, and determining logistics for handling chemicals. Identify adjuvants and additives to improve the effectiveness of current retardants. Evaluate fire control equipment.

**Progress:** The effective use of 12 gauge shotgun igniters developed for the Southern Forest Fire Laboratory to remotely ignite fuel from a road has been demonstrated on two forested areas. Artillery impact areas at Fort Stewart, Georgia were prescribed burned by firing fuses from military helicopters in a spot-grid pattern. The identical force technique has also been used in remote areas of the Everglades National Park in Florida from a leased helicopter. A Bellaville Beaver aircraft outfitted with internal 400 gallon tanks can build effective fireline when dropping ammonium phosphate fire retardant solutions.

**SUPPORTED BY** U.S. Dept. of Agriculture - F.S.

#### 5.0012, THE GREAT OAKLAND LOS ANGELES AND

will land fires swept into Oakland, the Newhall, Chatsworth, Simi, Malibu and Cajon Pass areas of Los Angeles County, and the Alpine, LaCresta, Jamul and Harbison area of San Diego County. The NOL-SRI Fire Research Group investigated four of these fires to determine factors that enabled wild land fires to enter urban areas, why some houses survived while those around it burned and the role of self-help. These fires followed the pattern expected during hot, dry weather at the end of summer when strong winds drive flames out of control.

Pub. Nov. 71: 82p., NTIS No. AD-736 605: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 5.0013, STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING ERTS DATA - ALASKA

*W.A. DEUTSCHMAN*, Smithsonian Institution, Cambridge, Massachusetts 02138

Abstract: The author has identified the following significant results. It has been possible to identify old fires in the Alaskan tundra and to monitor the development of active fires. The area burned can be quickly determined by a number of methods. The ERTS-1 satellite provides a convenient way to monitor fire damage in remote areas.

Pub. Dec 72: 3p., NTIS No. E73-10025: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

#### 5.0014, FIRE CONTROL, PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES

*V.J. JOHNSON*, Michigan State University, U.S.D.A. N. Cen. For. Ex. Sta., East Lansing, Michigan 48823 (NC2101)

Objective: Develop and apply weather and fire danger information needed for fire control planning, describe and characterize forest fuels, and develop and test methods for reducing the incidence of man-caused fires.

Approach: After empirically identifying the meteorological and climatic elements that contribute to large fire occurrence, a fire atlas will be made for the northeastern and north central States that will be useful for developing regional and interstate mobilization plans. Selective forest fuel information will be collected from various locations in the 21-State area and merged with data already on hand to develop regionwide fuel information. Concurrently, methods for rapidly sampling fuels will be devised. Fuel data will be interpreted in terms of its effect on fire behavior and incorporated into theoretical fire behavior models which will be validated by making pilot burn tests. Fire causes will be related to fire weather, fuel hazards, public activity, and other factors in an effort to identify where the fire prevention research effort should be concentrated. Cost analyses of various fire prevention techniques will be made, with the initial approach concerned with railroad-caused fires. Based on the success of developing prevention techniques for railroad fires, other aspects of fire prevention will be investigated.

Progress: Fuel treatment guides for Northeastern National Forests were developed from currently available fire behavior models combined with empirical fuel data. The guides include computer generated graphical displays of expected rates of spread and fire line intensities for various levels of slash loading and fuel depths in Eastern forests. Projections of slash production under various stocking levels and basal areas by species are displayed in tabular form. A climatology of precipitation duration has been assembled for use with the National Fire Danger Rating System. The climatology gives

mean years of individual fire cause data from 17 Northern National Forests isolated various combinations of and specific causes, and the activity and class of responsible for man-caused fires.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0015, FOREST FIRES IN MISSOURI

*D.A. HAINES*, U.S. Dept. of Agriculture, North Cen. Expt. Sta., St. Paul, Minnesota 55101

Abstract: The report describes factors that contribute to fires on two of the state of Missouri's protection districts in the Clark National Forest. It includes an analysis of cause, annual distribution, weather, and activity by week; and also discusses multiple-fire days.

Pub. May 73: 22p., NTIS No. PB-223 513/3: PC \$2.51.45.

SUPPORTED BY U.S. Dept. of Agriculture

#### 5.0016, FIRE WEATHER & BEHAVIOR OF THE SIOUX FIRE - MINNESOTA

*R.W. SANDO*, U.S. Dept. of Agriculture, North Cen. Expt. Sta., St. Paul, Minnesota 55101

Abstract: In mid-May 1971, a northern Minnesota fire almost 15,000 acres of forest land. Abnormally dry weather caused mild drought during a time of year when vegetation was still in the cured stage. Ignition began during one of the most severe fire-weather days experienced in the history of the Superior National Forest. The spread of the fire was enhanced by extensive cutover areas and grass marshes. Fires were a significant problem: their ignition and spread were greatly assisted by the dead fuels remaining from a spruce budworm outbreak of the early 1960's. Intense fires occurred in areas where the forest stands were young. Among the many complicating weather factors were shifts and high velocities associated with rapid frontal passages through the area.

Pub. Apr. 72: 12p., NTIS No. PB-223 411/0: PC \$2.51.45.

SUPPORTED BY U.S. Dept. of Agriculture

#### 5.0017, RESEARCH AND DEVELOPMENT OF FIRE PREVENTION TECHNOLOGY (FIRE PREVENTION)

*M.L. DOOLITTLE*, Mississippi St. University, U.S.D.A. Forest Expt. Sta., State College, Mississippi 39762 (SO)

Objective: Develop a system for forecasting long-range fire in man-caused fire occurrence and produce guidelines for incendiary fire problem analysis and prevention program.

Approach: Systematically analyze the association between fire occurrence and physical, social, economic, demographic, and political variables in a search for reliable and valid indicators of fire occurrence variation. Intensive study of a wide range of localized incendiary fire problems will produce most information upon which fire problem analysis guidelines will be based. Experimental and current prevention measures will be installed and evaluated following most of the studies. Study of incendiary fire problems, and prevention measures will augment the major effort.

Progress: A study of man-caused fire risk in six Southern States was designed to systematically analyze the structural,itudinal, and cognitive dimensions of risk. Upon the completion of the study, it was concluded that much of the variation in accidental fire occurrence can be explained

5.0018,

population density, rurality, and socio-economic status. Attitudes and knowledge about forest fire use and effects were more closely associated with incendiary fire occurrence than with accidental occurrence. The results of this study added significantly to an understanding of the nature of man-caused risk and are being used as a basis for research planning. An objective prediction of fire occurrence is a prerequisite for prevention program evaluation. In a recent evaluation of a personal contact program, the technique of using multiple regression as a predicting method in analyzing fire occurrence over time showed promise. A regression using two parameters reflecting weather variation (Spread Index and Class Fire Day), over a five year period of 40 monthly observations, yielded a highly significant equation, accounting for 65% of the variation in monthly fire occurrence.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0018, PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA

H.E. ANDERSON, U.S. Dept. of Agriculture, Intermtn. For. & Rg. Exp. Sta., Missoula, Montana 59801 (INT2104)

Objective: Determine and describe quantitatively those properties of forest and range fuels which affect ignition, spread and intensity of fire.

Approach: Investigate the physical and chemical properties of individual fuel particles that influence the ways they ignite and burn. Study the factors which determine the rates at which fuels exchange moisture with the atmosphere and the influence of heating on fuels and time-temperature curves for both spontaneous and pilot ignition of various fuels. Contribution toward the development of an ignition index for the National Fire Danger Rating System is an objective of the ignition research.

Progress: Research efforts have generated fuel inventory procedures, knowledge of fire history and fuel characteristics, data on growth cycles, seasonal change and daily variation, information on ignition properties of fine forest fuels, and consolidation of fuel data for appraisal, management, fire planning, fire-danger rating, and aerial attack research. The Region 1 Stage 1 resource inventory now incorporates fuel inventory methods and procedures. Computer programs for utilization of the data have been prepared; output is or will be used for two National Forests, R-1 Wilderness Study, INT-Wyoming Study. Data of crown weights is being gathered to improve residue weight estimates. Ecological land unit descriptions have been developed for the basis to the approved fire management plan in the R-1 wilderness study. Spontaneous and pilot ignition characteristics of pine needles, rotten wood, and cheatgrass are being documented and provide input to crowning and spot fire hazard considerations. Fuel appraisal elements have been identified and methods of relating to field personnel explored. The retardant retention efficiency by fuel size has been studied and results interpreted for use in the aerial attack research program. This research is providing essential data for the development of fire spread and intensity models, fire-danger rating, development of a fuels appraisal system, inputs to aerial attack research, and land management resource inventory requirements.

Objective: To determine the basic characteristics of fire lightning storms and methods and systems for their prediction and modification.

Approach: (A) Studying the physical processes involved in formation, movement, and behavior of lightning storms. Describing the properties of lightning discharges, measuring the characteristics of charge centers and the effects of strikes. (C) Studying physical processes related to the development of thunderstorms. (D) Studying the techniques, and results of weather modification procedures.

Progress: A mathematical cumulus cloud model was developed utilizing various aspects of existing cloud models. A test of the steady-state model indicates good agreement between a simulated cloud and measurements obtained of fair-weather cumulus clouds. Additional work is required to produce a model that can be used to study Rocky Mountain lightning storms. A cooperative lightning modification study between the Bureau of Land Management and the USDA Forest Service was initiated in 1973. The study is designed to determine the effect of BLM cloud seeding on the modification of Alaskan lightning storms. A study plan and airborne seeding operation are presently being prepared for the study. We have established that lightning discharges with long durations are the cause of most forest fire ignitions and that the probability of ignition is proportional to the current duration. Results from thunderstorm seeding experiments during 1965-67 show that, for this pilot experiment, cloud seeding reduced both the frequency of occurrence and the duration of long-continuing discharges. These results strongly imply that, if the effects of seeding on current durations can be reproduced on an operational basis, the seeding can be expected to substantially reduce the probability of forest fuel ignition by lightning from treated storm clouds. Additional evaluation of the effects of seeding on lightning under field conditions are required before a system can be made of potential operational programs.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0020, CONTROL AND USE OF FIRE PARTICULATES IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS

C.E. HARDY, U.S. Dept. of Agriculture, Intermtn. For. & Rg. Exp. Sta., Missoula, Montana 59801 (INT2102)

Objective: Incorporate research findings into the most effective means of solving the fire control problems of wilderness, park, and recreational area management. Determine the use of fire in resource management and the fire control material characteristics most suitable for fire control.

Approach: Develop a problem analysis of wilderness, park, and recreational area management in reference to fire control needs. Determining use of fire for hazard reduction and land management purposes. Screen fire retardant chemicals for suitability in fire control. Other research will focus on fire danger rating and its interpretation by user agencies.

Progress: A series of airdrop tests conducted last year and this year provided data on trajectory and ground pattern of retardant on several airtanker tank configurations and degrees of atomization (C-130 MAFFS), retardant rheologic properties, aircraft altitude and speed, and crosswind. Some helicopter data were collected. Work is continuing on

will help in comparing effects of other chemicals and additives.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0021, A MODEL OF THE FORESTS OF GLACIER NATIONAL PARK, MONTANA

R.H. WHITTAKER, Cornell University, School of Biological Sciences, Ithaca, New York 14850

Dr. Whittaker and his graduate student, Stephen R. Kessell, will investigate the forests of Glacier National Park, Montana, with a view toward the development of gradient models for three different approaches to the study of the distribution and structure of the forests: 1) a direct habitat-gradient analysis along elevation and topographic parameters, 2) an indirect gradient analysis of low-elevation lake influences and high-elevation wind-snow-exposure influences, and 3) a time gradient analysis of succession after fire. The component tree species will be viewed as distributed along the axes of the habitat hyperspace. An important aspect of the proposal is its potential for testing hyperspace and niche models in vegetative systems. In addition the results of field work and infrared photography will provide vegetation maps. The results of the successional study should permit predictions that will be useful for controlled fire management in Glacier National Park.

SUPPORTED BY U.S. Natl. Science Foundation

#### 5.0022, EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS

H.A. WRIGHT, Texas Technological University, School of Agriculture, Lubbock, Texas 79409

The proposed research plan involves studying the effect of prescribed burning on watershed cover, soil movement, overland flow, and water quality over a period of three years on an Ashe Juniper site. Replicate micro-watersheds will be constructed on three degrees of slopes in both (1) areas to be burned and (2) in areas not to be burned.

The specific area of study is about 40 miles east of Abilene, Texas, on the Caldwell Ranch.

The study will evaluate soil movement, overland flow, and water quality (determined by mechanical analysis and organic matter content) in relation to watershed cover, degree of slope, and intensity and duration of storms. Hence, fine study is designed to measure the magnitude of water yield, sedimentation, and water quality following a burn in relation to various degrees of cover and slope. If burning is going to be practiced, what are the gains and losses, and what are the sites where burning should not be allowed, if any, for maximum sustained yield and quality?

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 5.0023, NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I

A. SACHS, Inst. for Defense Analysis, Arlington, Virginia 22202

Abstract: The paper describes a prototype natural disaster operations plan for slowly developing natural disasters such as hurricanes, floods, or forest fires. An investigation was

SUPPORTED BY U.S. Dept. of Defense - Army

#### 5.0024, MECHANISMS OF WILDLAND FIRE SUPPRESSION

R.C. CORLETT, Univ. of Washington, School of Engineering, Seattle, Washington 98105

The ultimate objective is rational understanding of wildland fire response to fire suppression measures for use in the development of proper equipment, attack strategies, and management techniques that will minimize costs. Specifically, the research will delineate controlling suppression mechanisms for a set of fire situations and formulate meaningful field experiments, through analysis and laboratory experiments in cooperation with the U.S. Forest Service.

One phase of the program is the development of an understanding of the response of representative wildland fuel beds to the environment posed by the gas-phase fire, in conjunction with thermal and chemical disturbances due to suppressive action. A concurrent phase is the development of an understanding of the response of the gas-phase combustion processes when changes are imposed through modification of condensed-phase, ambient conditions, or through direct modification of the flame itself from suppressive actions.

Following an analytical integration of the two components, experiments will be conducted to validate and improve the models for the description of fires subjected to suppressive actions. The first suppressant will be water, followed by dry powders. Field experiments that can establish the validity of the formulated model will be specified.

SUPPORTED BY U.S. Natl. Science Foundation

### DISASTER MITIGATION

#### 5.0025, FIRE PREVENTION - CALIFORNIA

W.S. FOLKMAN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Objective: Define and quantify the parameters affecting risk; to measure the fire prevention knowledge and attitude of representative groups of forest users; and to develop measures for evaluating fire prevention programs.

Approach: Conducting a pilot study of fire prevention methods in a test community in Butte County, California; conducting a resurvey to determine changes in fire prevention knowledge and attitudes of county residents; and analyzing 'fire prevention' content of newspapers of the area. Evaluating prevention films developed for use as television 'spots'; testing effectiveness of special programmed conservation education materials in lower school grades; and studying fire prevention signing and other preventive materials and techniques. Identifying and characterizing high-risk forest users. Studying the organizational characteristics of forestry activities related to the effectiveness of fire prevention efforts.

Progress: Evaluation of the experimental fire prevention program in Butte Co., California showed little change in levels of knowledge and attitudes among the resident population from 1964 to 1970. Fire records do show a drop in fire starts in the county during period of intensive prevention activity, 1962-1969. Progress in the development of fire prevention



normal viewing. Youth film was found to be more effective than Smokey film in making people in general more concerned about fire law enforcement. A coordinated program for teaching fire prevention and conservation education to children (K-3) has been developed from the studies at Ohio State and the Headstart Project.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

**5.0026, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

J.T. ALFORE, State Div. of Mines & Geology, Sacramento, California 95814

Abstract: This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: PC \$7.75 MF 1.45

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**5.0027, NATIONAL FIRE DANGER RATING**

J.W. LANCASTER, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta., Fort Collins, Colorado 80521 (RM2106)

Objective: Develop a fire-danger rating system suitable for use by all wild-land fire control agencies.

Approach: The system will include as a minimum a dispatching index, a presuppression index and a seasonal severity index. All indexes and guides will be developed from existing information or information provided concurrently by other fire research work units. The dispatching index will be a suitable combination of a rate-of-spread and a rate-of-combustion index. The presuppression index will be a combination of the dispatching index and potential numbers of fires. Presuppression indexes can be accumulated to provide a seasonal severity index. Guidelines for defining areas sufficiently homogeneous for fire danger rating will also be provided.

Progress: NFDR system implementation proceeded on a large scale in 1972. The U.S. Forest Service adopted it, and most USFS Regions have completed installation. Other users in 1973 are the National Park Service, Bureau of Indian Affairs and, at least 15 States. The Bureau of Land Management plans adoption in 1974. Joint implementation efforts are given high priority, and cooperative efforts have resulted in new methods of smoothing the transition. Means of obtaining full advantage of new NFDR capabilities are being explored with users. Computer software work resulted in program AF-FIRMS, which will undergo 1973 field trials. It yields real-time observed and forecast NFDR numbers, sets preparedness levels, and archives data. Any subscriber in the United States may access this program after it is released for use in the Fall of 1973. Contracts will complete the principal work remaining on the fuel moisture analog, and the manual weighing scheme will undergo field trials in 1973. Electronic analog measurement investigations continue. Telemetry sta-

tions, as do snowpack-fuel moisture studies, operational NFDR applications; and optimization of rating station networks through fire climate analyses.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

**5.0028, AIRBORNE INFRARED FOREST FIRE DETECTION SYSTEM**

R.A. WILSON, U.S. Dept. of Agriculture, Northern Forest Fire Lab., Missoula, Montana 59801

Abstract: The report outlines the basic requirements for an airborne infrared forest fire detection system and discusses the capability of the system to detect hot fire targets in natural forest backgrounds.

Pub. May 71: 111p., NTIS No. AD-726 953: PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Agriculture

**5.0029, RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION**

D.W. KRIEGER, U.S. Dept. of Commerce, Natl. Weather Service, Atlantic City, New Jersey

Abstract: The National Weather Service radars now watch over many of the country's forests. Pictures from these radars can be remoted to Fire Control Offices and National Weather Service Forest Meteorologists. Data from the radars have a great deal of potential value to fire control officers. Some applications include (1) helping to determine areas of high or low buildup index, (2) locating areas to be searched for possible lightning caused fires, (3) delineating windshifty approaching going fires and (4) showing paths of showers that may reduce fires or assist mop up.

Pub. 1971: 11p., NTIS No. COM-71 00601: PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Commerce - NOAA

**5.0030, THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY**

V.I. BINENKO, U.S. Air Force, Foreign Technology Division, Dayton, Ohio 45433

Abstract: The need for seeking a new, reliable method which makes it possible to detect centers of combustion in forest fires in early stages of their development is well known. Such a method can become the method of infrared photography from aircraft. The purpose of the report is to evaluate the possibilities of using infrared scanning equipment for the detection of centers of combustion of small dimensions.

Pub. May 73: 17p., NTIS No. AD-762 265: PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Defense - Air Force

**5.0031, OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA**

J.D. KANUPP, U.S. Dept. of Commerce, Natl. Weather Service, Columbia, South Carolina

Abstract: The publication contains the operating plan for fire weather service in South Carolina. It describes the service and methods of obtaining it. It explains details on how fire weather observations are made and reported and provides phone numbers of fire weather offices and residence phone numbers of fire weather forecasters. Details on fire weather warnings and advisory weather information/briefings during critical fire weather conditions are given.

5.0032, CORRELATION OF SATELLITE AND GROUND DATA IN AIR POLLUTION STUDIES (ABBREV)

G.E. COPELAND, Old Dominion University, Graduate School, Norfolk, Virginia 23508

Abstract: The author has identified the following significant results. Analysis of U-2 imagery of CARETS site indicates smoke plumes can be easily detected. First look at selected ERTS-1 color composites demonstrates plumes from forest fires can be detected.

Pub. Sep 72: 12p., NTIS No. E72-10160: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

## HAZARD REDUCTION

5.0033, FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT

C.J. AUVIL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: The Fire Environmental Test Chamber at the Forest Fire Laboratory, Riverside, California, can duplicate under controlled conditions the key factors that affect the flammability of wildland fuels. Within certain limits, it can produce air flow, solar radiation, temperatures, and relative humidity. First developed in 1962, the test chamber has since then undergone several modifications to meet requirements over and above the original capabilities. The characteristics of the test chamber and nature of the changes are explained. Recommendations on design and development are offered.

Pub. 1973: 10p., NTIS No. PB-225 402/1: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Agriculture

5.0034, FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971

G.C. BERNARDI, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: Use of certain types of equipment during fire season is a major cause of forest fires in California. To determine what these types are and the characteristics of people using them, the fire investigation reports for one unit of the California Division of Forestry were analyzed for critical fire weather periods over a 10-year span. Roadway vehicles -automobiles and trucks- were responsible for most of the equipment-use fires. But few such fires, when starting in critical fire weather, reached major proportion. Most of the major roadway vehicle fires started during non-critical periods. Recommendations for improving the Fire Investigation Reports and for new regulatory measures are offered.

Pub. 1974: 8p., NTIS No. PB-231 080/3: PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Agriculture

5.0035, ALLOCATION MODEL FOR FIREFIGHTING RESOURCES

F.W. BRATTEN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: A study is underway to develop computer techniques for planning suppression efforts in large wildfires. A mathematical model for allocation of firefighting resources in a going fire has been developed. Explicit definitions are given for strategic and tactical planning functions. How the model might be used is illustrated by a fictitious but realistic

SUPPORTED BY U.S. Dept. of Agriculture

5.0036, CHARACTERISTICS OF PEOPLE WHO START FIRES -SOME PRELIMINARY FINDINGS - CALIFORNIA

J.R. CHRISTIANSEN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: Recreationists or city dwellers are usually most often thought of as being responsible for starting forest fires. But a limited study showed that fire starters were more apt to be people who lived near and worked on the national forests. They were relatively young and undereducated, and had good reputations in their communities. Employers held responsible for forest fires started by their employees most often had multiple fire violations, but good reputations in their communities. These and other characteristics of fire-starters were identified by analyzing 165 fire trespass reports from the Forest Services's California and Intermountain regions.

Pub. 1971: 7p., NTIS No. PB-107 883: MF \$0.95.

SUPPORTED BY U.S. Dept. of Agriculture

5.0037, REDUCING FIRE HAZARD IN PONDEROSA PINE THINNING SLASH BY MECHANICAL CRUSHING - OREGON

J.D. DELL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: Precommercial thinning in ponderosa pine stands in the Western United States is a growing practice. Thinning slash can, however, be a serious fire hazard in dry areas. Crushing and compacting this slash may be one way of reducing the hazard. Three types of mechanical crushers were tested on the Deschutes National Forest, Oregon. Results indicate that at least one of these methods of mechanical crushing is effective for lessening the fire hazard in thinning slash, and can be done at reasonable costs.

Pub. 1969: 14p., NTIS No. PB-193 696: MF \$0.65.

SUPPORTED BY U.S. Dept. of Agriculture

5.0038, FOREST FIRE HISTORY - A COMPUTER METHOD OF DATA ANALYSIS

R.M. MEES, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: A series of computer programs is available to extract information from the Individual Fire Reports (U.S. Forest Service Form 5100-29). The programs use a statistical technique to fit a continuous distribution to a set of sampled data. The goodness-of-fit program is applicable to data other than the fire history. Data summaries illustrate analysis of fire occurrence, detection and initial attack time, and space and time relationships of multiple fires.

Pub. 1972: 9p., NTIS No. PB-225 397/9: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Agriculture

5.0039, PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL

P.G. SCOWCROFT, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California 94701

Abstract: Probability fire weather forecasts were compared with categorical and climatological forecasts in a trial in southern California during the 1965-1967 fire seasons. Equations were developed to express the reliability of forecasts and degree of

probability forecasting to be used by fore-  
casters will need help in the necessary computations and  
some decision criteria for planning.

Pub. 1970. 7p. NTIS No. PB-207 794; MF \$0.95.

SUPPORTED BY U.S. Dept. of Agriculture

#### 5.0040, FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION

M.J. SCHROEDER, U.S. Dept. of Agriculture, Pac. S.W. For.  
& Rg. Exp. Sta., Riverside, California 92507 (PSW2108)

Objective: Define and describe topocscale and mesoscale  
weather patterns in the Pacific coastal region which affect  
the ignition and spread of wildfire; determine how these pat-  
terns vary and how they are affected by larger scale patterns,  
heating, topography, and forest characteristics.

Approach: Study problems caused by continental air masses,  
marine air masses, and their interactions. Conduct an analysis  
of existing weather data to determine mesoscale patterns of  
marine air or continental air invasions. Conduct field studies  
to measure topocscale patterns in three dimensions. Develop  
theoretical mathematical or physical models of the meso- and  
topocscale weather patterns using analyses of field data as  
guides

Progress: Three kinds of mesosystems--two squall mesosystems,  
an instability line, and a strong marine push--were observed  
in Oregon on the same day. Each system produced sudden  
changes in temperature and gale-force winds, yet none was  
identified on routine synoptic analyses. The impact of these  
mesosystems emphasizes the need for greater attention to  
mesoscale systems for identification and warning of impor-  
tant summer weather events. A detailed study resulted in  
several important findings: photochemical oxidant that  
formed in the marine layer is vented up the slopes and over  
the crest of the San Bernardino Mountains during the day,  
layers of high oxidant concentrations were detected above  
the inversion base, suggesting that some pollution is vented  
up the slopes and subsequently advected back above the in-  
version base, and the diurnal changes in the temperature in-  
version also contribute to the high concentration found  
within the inversion. These processes result in multi-layers of  
pollution. The study suggests that oxidant air pollution is  
transported up to 80 mi. to forested mountains, where severe  
damage to conifer species has been documented. Measure-  
ments of oxidant air pollution, temperatures, and wind speeds  
were made in the Central Valley, Sierra Nevada foothills, and  
a high mountain valley. Evidence was recorded of the trans-  
port of photochemical smog from the Central Valley to  
Mineral King. FIRDAT, a Fortran IV program has been writ-  
ten to compute the daily components and indexes of the Na-  
tional Fire Danger Rating System.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0041, FOREST FIRE STATISTICAL PROBLEMS

F.N. DAVID, Univ. of California, School of Agriculture, River-  
side, California 92502

The objective is to solve some statistical problems that have  
arisen in connection with the development of a basic simula-  
tion model for forest fire control by the Forest Fire Labora-  
tory of the Pacific Southwest Forest and Range Experiment  
Station of the Forest Service. In cooperation with the Forest  
Service, which will make its data available, the following  
statistical studies will be investigated in order to improve the  
simulation model: 1) distribution of fire starts related to  
probable cause and terrain, 2) production rates of fire line

relative to terrain and weather conditions, 3) the data  
sufficient data base and the handling of the data. Some  
possible associative quantities can be retrieved and  
SUPPORTED BY U.S. Natl. Science Foundation

#### 5.0042, DEVELOPMENT OF IMPROVED TECH- NIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN

R.W. COOPER, U.S. Dept. of Agriculture, S.E. For-  
est Station, Macon, Georgia 31202 (SE-21011)

Objective: Develop improved methods of using fire to  
manage fuel areas and to accomplish silvicultural objec-  
tives; determine stand, fuel, and weather conditions under  
which appropriate firing techniques will produce a fire of the  
desired intensity and behavior; to be alert to alternative  
fuel reduction.

Approach: Developing improved instrumentation for  
measuring both the prescribed fire and its environment  
temperature relationships, heat yield, and flame charac-  
teristics are of primary interest. Continuing studies  
include: techniques. Studying the use of prescribed fire for  
hazard reduction. Evaluating other promising  
hazard reduction or prevention of fire from hazard

Progress: About two-thirds of the annual forest and  
rangeland burning in the South is done in January, Feb-  
ruary, and March. Maximum particulate levels in rural areas  
recorded in April and May with a secondary peak  
not coinciding with maximum prescribed fire ac-  
tivity. Particulate counts averaged out at about 35 micrograms  
per cubic meter throughout the year. When little or no  
burning takes place before actual ignition of living vegeta-  
tion, particulate production may exceed 100 pounds per  
acre burned; when preheating is extensive prior to burn-  
ing, particulate production may be less than 40 pounds  
per acre burned. Hydrocarbon and carbon monoxide pro-  
duction follow the same general trend. The manner in which  
fuel is put into the air is a function of the type of  
fuel consumed, its moisture content, the rate of fire spread,  
and the rate of fire spread. The manner in which  
fuel is dispersed is a function of atmospheric stability,  
wind velocity. Prescribed fires may actually enhance  
pollution by reducing the number, size, and intensity of  
fires and their resulting atmospheric contamination.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

#### 5.0043, THE INFLUENCE OF WEATHER AND TOPOGRAPHY ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH

D.T. WILLIAMS, U.S. Dept. of Agriculture, S.E. For-  
est Station, Macon, Georgia 31202 (SE-21011)

Objective: Identify, measure, and correlate meteorological  
variables and establish how the interactions of these variables  
affect fire potential and behavior.

Approach: Studying humidity as related to fuel moisture  
content, identifying situations leading to air mass insta-  
bility, and convection phenomena. Studying the  
interaction of the continental and maritime air masses.  
Continuing analyses of fire, weather, and fire damage  
measurements on going fires, and case studies. In-  
vestigating extreme behavior to provide information for  
forest managers in interpreting danger ratings during  
periods. Defining elements involved in the depletion  
of moisture of forest fuels caused by long-term drought.

**Progress:** Sea breeze fronts occur in coastal Georgia on about one-third of the days during late winter and early spring. A simple method, which uses morning wind speeds and the expected afternoon maximum temperature, permits crews to determine whether or not a sea breeze front will influence a fire. Maximum fire danger in coastal Georgia occurs at 1300 EST in summer and 1500 EST in winter. Lightning-strike fires in southeastern Georgia are more likely on thunderstorm days with high values of buildup and spread index than on other thunderstorm days. Smoke from the Florida Everglades fires of 1971 restricted visibilities and limited aircraft takeoffs and landings at Palm Beach International Airport during 17 days in April, but amounts of particulates did not exceed the national standard for air quality.

**SUPPORTED BY** U.S. Dept. of Agriculture - F.S.

#### 5.0044, DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS

**G. YAMATE**, IIT Research Institute, Chicago, Illinois 60616

**Abstract:** This report contains emission factors (weight of pollutant per acre burned) for estimating atmospheric emissions from forest fires (especially wildfires) for each of the ten U.S. Forest Service regions in the U.S. The pollutants considered are: total particulates, hydrocarbons, carbon monoxide, nitrogen oxides, and sulfur oxides. Data on acreage consumed by wildfires are used with the factors to estimate mass emissions for each region. The effects of such variables as terrain, density of vegetation coverage, type of vegetation, wind speed, and humidity are also discussed. Finally, proposed approaches to mathematically correlate these variables (via empirical and theoretical models) with both emission factors and mass emissions are presented.

Pub. Oct. 73: 147p., NTIS No. PB-230 889/8: PC \$4.75 MF \$1.45.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

#### 5.0045, FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN

**D.A. HAINES**, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., St. Paul, Minnesota 55101

**Abstract:** Case studies indicate that optimum conditions for development of flat-terrain, fire whirlwinds include: (1) A fire of sufficient acreage and intensity to create the heat source. Methods of burning are also important. (2) A superadiabatic lapse rate through the lower 300 to 400 feet with a lapse near the dry adiabatic for favorable lapse rate. (3) Little or no wind. (4) Clear skies, although fire whirlwinds have occurred under overcast conditions and even at night, clear skies are optimum. Even though fuels will often burn well, less than 10 percent of fire-season days fulfill these conditions in the Upper Midwest.

Pub. Dec. 71: 17p., NTIS No. PB-223 399/7: PC \$2.75 MF \$1.45.

**SUPPORTED BY** U.S. Dept. of Agriculture

#### 5.0046, FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES

**S.N. HIRSCH**, U.S. Dept. of Agriculture, Intermtn. For. & Rg. Exp. Sta., Missoula, Montana 59801 (INT2105)

**Objective:** Develop equipment, methods, and systems for fire detection and mapping.

sociated with small fires. Determine the usefulness of airborne infrared line scanners for the detection of incipient spot fires. Analyze the fire detection systems in use in the National Forests. Study the techniques for employing infrared line scanners on large fire mapping problems.

**Progress:** Performance specifications for infrared scanners are now available. Methods to transmit infrared imagery from plane to ground are being studied; radiofax components were successful enough in the first trials to encourage us to investigate further. A slide tape on use and performance of a small inexpensive aerial 'fire spotter' was prepared. Heat particulate and gaseous emissions from small fires burning in rotten wood provided data to complement a theoretical and state-of-the-art study to measure such emissions for fire detection purposes.

**SUPPORTED BY** U.S. Dept. of Agriculture - F.S.

#### 5.0047, FIRE ON A FOREST SOIL

**D.W. COLE**, Univ. of Washington, School of Forestry, Seattle, Washington 98105 (WNZ00012)

**Objective:** Study the effect of burning as a process, evaluating both the changing character of the elemental capital and the dynamic nature of elemental movement.

**Approach:** Evaluate the changes that have developed in the basic organic and mineralogical composition of the soil during and following burning. Determine the pathways and rates of elemental movement in the soil following burning utilizing a tension lysimeter system.

**Progress:** A system utilizing tension lysimeters has been developed to measure changes in ion transport in the soil of a forest stand subjected to slash burning. The results of this study show that 1. Slash burning causes transfer of large quantities of nutrient elements both to the soil and to the atmosphere. 2. This increase in elemental transfer is related to the fuel load. 3. Elemental loss from the rooting zone is increased up to 450% by burning. 4. Leaching of the ash layer is the major source of mobile elements, heating of the soil has only a temporary effect on elemental mobility. 5. Transport of elements through the soil is related to the solubility of the ash constituents. These results have led to the publication of a paper. In addition, this work has led to the development of an expanded program of fire research in cooperative agreement with the U. S. Forest Service.

**SUPPORTED BY** U.S. Dept. of Agriculture - C.S.R.S.

## 6. FLOODS

### INDIVIDUAL ASSISTANCE

#### 6.0001, DISASTER INVESTIGATIONS

**C.G. CULVER**, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

**Reasons for starting or progress last year:** Post disaster investigations conducted last year include: (1) Flood damage following Hurricane Agnes, (2) Managua Earthquake investigation, (3) Collapse of Skyline Towers high-rise apartment building, and (4) Tornado damage in Fairfax County, April 1973.

The Hurricane Agnes investigation led to an NBS project for the Department of Housing and Urban Development in

Nicaraguan government in evaluating the safety of buildings in Managua. A report of this work will be published in the Bulletin of the Seismological Society of America. In addition, CBT is working through the Department of Commerce in assisting with the development of building standards for the reconstruction activities in Managua.

As a result of the initial Skyline Tower investigation, NBS worked on a project for the Occupational Safety and Health Administration to determine whether any OSHA standards had been violated during the construction of the building and if standards violation contributed to the collapse. A final report on this project was submitted to OSHA on June 11, 1973. In addition, an Interagency Agreement between NBS and the Department of Labor related to continuing NBS technical assistance relative to OSHA activities was formalized.

The investigation of tornado damage provided direct input to a project being conducted by CBT for the Defense Civil Preparedness Agency regarding the natural hazards evaluation of existing buildings. Typical failure modes produced by tornadoes were identified and significant building parameters to be evaluated in surveying the hazard potential of existing buildings were developed.

Approach: Investigations will be conducted following the occurrence of significant natural disasters including earthquakes, hurricanes and tornadoes. Surveys of other disasters, such as building collapses, fires, etc. will also be conducted as part of this program. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

#### 6.0002, THE FEDERAL RESPONSE TO TROPICAL STORM AGNES, A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF

UNKNOWN, U.S. Exec. Office of the Pres., Off. of Emergency Preparedness, Washington, District of Columbia 20006

This report covers the activities of the Office of Emergency Preparedness and other Federal agencies in the seven States that were declared major disaster areas as a result of Hurricane Agnes and the ensuing tropical storm. By bringing together in one report the activities of several agencies, the report highlights the coordination that was achieved among local, State, Federal, and voluntary agencies in restoring community services and aiding individuals to recover from the effects of this disaster.

Pub. May 73: 62p., Fed. Disaster Assist. Admin., Dept. of HUD, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0003, SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS

C.D. HARVEY, Boise State College, School of Arts, Boise, Idaho 83707

This study would compare reactions of female subjects to a flood in the Silver Valley, Shoshone County, Idaho, with reactions of females to a previous mine disaster in the same community. The flood occurred in January, 1974, forcing evacuation of over 800 families and causing millions of dollars of damage to property. The mine disaster occurred in May, 1972, trapping 93 miners for a week and killing 91 of them. Data were collected in November, 1972, by the principal investigator of this proposal regarding women affected

disaster would be drawn.

Specific objectives include the following: (1) to compare evacuees to non-evacuees in social response to the flood, (2) to analyze emergent norms in the flood as contrasted to the mine disaster, (3) to evaluate effectiveness of aid in both disaster situations, (4) to test theoretical models of family stress, and (5) to evaluate psychological effects of trauma as mediated by locus of control.

Methods would include interviews with 100 evacuees and 100 nonevacuees. Part of the schedule would replicate the mine disaster study, including such items as anonymity and negative feelings scales, source and content of initial disaster news, activity during disaster, and assignment of blame. Part of the schedule would include information on evacuation patterns found in other floods; personality information on locus of control and trauma would also be gathered.

Analysis of the data will focus on a comparison of the evacuees to nonevacuees in terms of social definitions of the flood and personality influences on trauma, as well as a comparison of social processes in the two disasters.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - A.D.M.H.A

#### 6.0004, FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT

R.J. BURDGE, Univ. of Kentucky, Water Resources Institute, Lexington, Kentucky 40506

Abstract: The focus of the paper is on the question of how rural people anticipate forced moves as a result of flood control projects and how they change their life in accepting separation from familiar surroundings. A model of forced migration is presented which sees the variables of socio-economic status, knowledge of reservoir projects, vested interests and the degree of identification with place of affected persons as producing differential apprehension over moving. Differential apprehension is then seen as producing different attitudes toward the project which will influence the type of migration plans. To test this model of forced migration, data were obtained by means of personal interview with 261 adults located in two areas about to be flooded by multipurpose reservoirs. Goodman and Kruskal's gamma was used as the measure of association for the ordinal data.

Pub. 1970: 41p., NTHS No. PB-196 659, PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.I

#### 6.0005, FLOOD INSURANCE STUDY

C. BARRIENTOS, U.S. Dept. of Commerce, National Weather Service, Silver Spring, Maryland 20910

Technical objective: Determine the extent of inland flooding in response to a storm surge on the open coast. Results will enable the Federal Insurance Administration of HUD to set insurance rates for coastal properties.

Approach: Beginning with the storm surge envelope on the open coast computed by the "SPLASH" program, past storms are examined for relationships between such storm parameters as size, intensity, motion, etc., and the height of inland inundation. Initially the study will be constrained to flood effects inland from an uninterrupted coastline.

Progress: A mathematical surge inundation model for an unbroken coast has been developed and applied to the Charleston, S.C., area and the west coast of Florida to assess flood potential.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0006, FLOOD INSURANCE STUDY**

*D. FEIT*, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910 (R3427200)

Technical objective: Determine the extent of inland flooding in response to a storm surge on the open coast. Results will enable the Federal Insurance Administration of HUD to set insurance rates for coastal properties.

Approach: Beginning with the storm surge envelope on the open coast computed by the SPLASH program, past storms are examined for relationships between such storm parameters as size, intensity, motion, etc., and the height of inland inundation. Initially the study will be constrained to flood effects inland from an uninterrupted coastline.

Progress: After sufficient data was collected, work began on development of a mathematical model to handle inundation from storm surge at an unbroken coastline.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**6.0007, CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM**

*L.R. CHEATHAM*, Mississippi St. University, Graduate School, State College, Mississippi 39762

The objective of the study is to determine the impact of flood insurance on flood plain use and development, by means of a case study. Businessmen and realtors in the case study area will be surveyed for the purpose of acquiring information relative to the impact of availability of flood insurance on capital expenditure decisions and on property values. Flood plain use in the area will be evaluated in terms of economic impact on a municipality and in terms of the Federal Flood Insurance Program purposes.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0008, MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA**

*UNKNOWN*, State Dept. of Pub. Welfare, Camp Hill, Pennsylvania 17011 (HSM-42-73-27)

The Contractor shall provide mental health services to the residents of flood disaster areas in Central Region, Commonwealth of Pennsylvania. Specifically, the Contractor shall: 1. Provide direct services to alleviate identified mental health disabilities and to prevent the development of overt mental health problems. In addition, other human resource agencies in the affected areas will be identified so that information and referral can be facilitated when indicated. 2. Develop a program design so that a cadre of human service workers can be deployed to provide the maximum contact with those groups in the affected communities identified as being at high risk for mental disabilities. Such groups shall include the elderly, children, displaced persons and families (including those in mobile home camps), the unemployed, the physically disabled, and those previously identified as emotionally disturbed. The emphasis is to be on a community-based, highly mobile, cadre to have the capability to go where the problems are. 3. Explore all aspects of potential mental health problems so that disabilities can be averted, including suicide prevention, depression, adolescent run-aways, drug

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

**6.0009, MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA**

*UNKNOWN*, Hazleton Nanticoke M.H. & M.R., Nanticoke, Pennsylvania 18634 (N01-MH-4-0008)

Independently, and not as an agent of the Government, the Contractor shall furnish all necessary labor, materials and facilities to provide mental health services to the residents of flood disaster areas in Luzerne-Wyoming Counties, Commonwealth of Pennsylvania. Specifically, the Contractor shall: 1. Provide direct services to alleviate identified mental health disabilities and to prevent the development of overt mental health problems. In addition, consultation with other human resource agencies will be continued so that information and referral can be facilitated when indicated. 2. Continue the existing program design developed under Contract No. HSM-42-73-28, so that a cadre of human service workers will be deployed to provide the maximum contact with those groups identified as being at high risk for mental disabilities. Such groups shall include, but not be limited to, the elderly, children, displaced persons and families (including those in mobile home camps), the unemployed, the physically disabled, alcoholics, and those previously identified as emotionally disturbed. The emphasis shall continue to be on a community-based, highly mobile, cadre to have the capability to go where the problems are. 3. Explore all aspects of potential mental health problems so that disabilities can be averted, including suicide prevention, depression, adolescent run-aways, drug abuse, etc. Special programs could be instituted with local support where indicated. 4. Provide primary prevention services by raising the profile of the community mental health centers and making the community members more aware of existing mental health programs and facilities. 5. Provide appropriate human related services to individuals and families in crisis.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

**6.0010, TRAINING AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA**

*UNKNOWN*, Eastern Penn. Psych. Institute, Philadelphia, Pennsylvania 19129 (HSM-42-73-29)

The Contractor shall plan, develop and implement a mental health training program for human services aides to deliver services to the recent flood victims of the Commonwealth of Pennsylvania and to provide for an evaluation of the training and services relevant to the delivery of mental health services: 1. Human Services Aides Training Program - The Contractor shall plan, develop and implement a mental health training program for human services aides to deliver services to the recent flood victims of the Commonwealth of Pennsylvania. The Contractor shall: a. Search literature regarding crisis intervention for implications for training in the evaluation and meeting of flood and disaster victims' needs. b. Determine the specific problems and needs of the affected

ing program. d. Establish the numbers and characteristics desired of individuals to be trained with particular emphasis on utilization of indigenous, nonprofessional people. e. Develop a suitable training program which will initially train as large a number of persons as possible in a relatively brief period of time (i.e. 5 to 6 days) so as to be able to begin providing services shortly thereafter. 2. Evaluation of Training and Services - The Contractor shall provide for an evaluation of the training and services to determine the effectiveness of the training and services relevant to the delivery of mental health services. The evaluation of both training and services will be concerned with three areas, namely structure, process and outcome.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

#### 6.0011, MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA

UNKNOWN, Luzerne Wyoming Co. M.H. Prog., Wilkes Barre, Pennsylvania 18702 (HSM-42-73-28)

The Contractor shall provide mental health services to the residents of flood disaster areas in Luzerne-Wyoming Counties, Commonwealth of Pennsylvania. Specifically, the Contractor shall: 1. Provide direct services to alleviate identified mental health disabilities and to prevent the development of overt mental health problems. In addition, other human resource agencies in the affected areas will be identified so that information and referral can be facilitated when indicated. 2. Develop a program design so that a cadre of human service workers can be deployed to provide the maximum contact with those groups in the affected communities identified as being at high risk for mental disabilities. Such groups shall include the elderly, children, displaced persons and families (including those in mobile home camps), the unemployed, the physically disabled, and those previously identified as emotionally disturbed. The emphasis is to be on a community-based, highly mobile, cadre to have the capability to go where the problems are. 3. Explore all aspects of potential mental health problems so that disabilities can be averted, including suicide prevention, depression, adolescent run-aways, drug abuse, etc. Special programs could be instituted with local support where indicated. 4. In performing the above, the Contractor shall utilize a cadre of 50 indigenous human service workers, at the para-professional level, to be recruited and trained to perform such outreach services as will be determined specifically when the need is fully assessed.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

#### 6.0012, PROCEEDINGS - COMMUNITY WORKSHOP ON FLOOD INSURANCE

J.E. HACKETT, Virginia Polytechnic Institute, Water Resources Research Ctr., Blacksburg, Virginia 24061

Abstract: Contents: The flood insurance program and the community; Needs for final preparedness; The meaning of the flood insurance program to the state, the community, and the individual; The flood insurance program from an administrative and financing standpoint; Information needs of the regular program and the emergency program; Corps of engineers

Pub. Aug. 71: 175p., NTIS No. PB-203 739; PC \$3.00 MF \$0.95.

SUPPORTED BY Virginia Polytechnic Inst. - Blacksburg

#### 6.0013, EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA

B.R. WALKER, Virginia Polytechnic Institute, Graduate School, Blacksburg, Virginia 24061

The first part of the study will be devoted to compiling flood damage data from the various sources. A certain amount of reconciliation will be necessary to insure completeness without duplication.

A computer analysis will be developed to assess the costs and the payouts for various levels of coverage.

An effort will be made to assess the rate of recovery, with and without insurance. The source of funds provided the community for recovery will be identified. The impact on the locality and the state when all of the direct costs of flooding are shifted from a general responsibility to an insurance concept will be examined.

Once a city or town qualifies for insurance by adopting certain land use practices, it is still a private market operation to provide insurance coverage. Would a high percentage of coverage on an involuntary basis be required to make insurance practical is a question to be investigated in the light of this disaster. Although the risks are spread over a much larger population than the study area, some indication or trend might be evident as to whether private insurance could ever become a reality or whether subsidized premiums is a more efficient means of allocating the cost of recovery.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Recl.

#### 6.0014, DELIVERING VOCATIONAL REHABILITATION SERVICES IN A DISASTER AREA

F.R. PHELPS, State Div. of Voc. Rehab., Charleston, West Virginia

Abstract: The principal objective of this project was to respond immediately to the sudden and drastic increase in the need for vocational rehabilitation services precipitated by a major flood disaster. The focus was on delivering vocational rehabilitation services to eligible handicapped individuals in the disaster area. In addition, the project was utilized to gain information and experience needed to plan the role of the state vocational rehabilitation agency in disaster situations.

Pub. Jun. 73: 14p., NTIS No. PB-222 775/9; PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel.

#### PUBLIC ASSISTANCE

#### 6.0015, ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME I

UNKNOWN, W.A. Wuhler & Associates, Palo Alto, California 94303

Abstract: On February 26, 1972, a coal refuse dam, owned and operated by the Buffalo Mining Company, failed near Saunders, W. Va. The resulting flooding of the Buffalo Creek Valley had national ramifications. The immediate consequences

gineers and the U.S. Geological Survey undertook limited field and laboratory testing. These original investigations contributed to an understanding of the Buffalo Creek Flood. The study presents a comprehensive view of the failure with essential data integrated from many sources, and an analysis of the failure based on a thorough program of subsurface exploration and sampling, field and laboratory testing, and engineering analyses.

Pub. Feb. 73: 286p., NTIS No. PB-215 142/1: PC \$6.75 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Bureau of Mines

#### 6.0016, A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES

F.F. CHANG, Fed. City College, Graduate School, Washington, District of Columbia 20001

**Abstract:** The report presents a statistical summary of the cause and cost of bridge failures based only on a review of damage reports in the FHWA Emergency Relief files for major floods that have occurred during the last few years. As was anticipated, these reports yielded very limited reliable data, so the dollar projections must be viewed accordingly. The general trends, however, should serve as guideline for future research in related areas. Of 383 cases, 14.9 percent reported damages to the superstructure, 24.5 percent to the pier, and 71.8 percent to the abutment; in 43.2 percent of the cases, the damage extended to the approach roads. In 341 cases where the causes of failure were either stated in the original files or theorized by the reporter, only 6.9 percent of the failures were attributed to riverbed changes (aggradation and degradation), 29.6 percent were attributed to vigorous change in flow, 38.8 percent to flowpath deficiency, 20 percent to floating debris, and only 4.7 percent to structural deficiency.

Pub. Sep. 73: 47p., NTIS No. PB-224 091/9: PC \$3.00 MF \$1.45.

SUPPORTED BY No Formal Support Reported

#### 6.0017, UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL.

UNKNOWN, Upper Miss. Riv. Comp. Comm., Chicago, Illinois

**Abstract:** The analysis of floods, flood damage and criteria for flood plain development and flood control programs is given for the Basin, based on an evaluation of geographic, hydrologic and economic factors of flood plain use and development, corresponding average annual flood damages and projections of increased flood plain value, technological research, and information essential to an action program for flood control. Waterborne commerce is directly related to the investments of private industry in terminal and transport equipment and the improvement in the design and operation of the equipment. The commercial navigation needs in the Basin were determined by an analysis of existing and future waterborne commerce on the Upper Mississippi River System. Nine commodity groupings were used.

Pub. 1970: 369p., NTIS No. AD-730 113: MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0018, URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS

Although urban growth is generally guided by land use zoning with the intent of preventing negative externalities, urban growth may alter the frequency and magnitude of flooding and generate negative externalities.

The specific objectives of this research are to: 1. Determine the impact of urbanization upon flooding frequency and magnitude and to determine watershed hydrological response as a function of urbanization parameters. 2. To delineate flood hazards attributable to urbanization and to predict increased flood hazards. 3. Questionnaire survey of residents and property owners along Ralston Creek will be taken. Estimation will be made of recent flood damages and changes in property values as a result of changes in flood hazard. 4. To determine the income distribution effects associated with the negative externality of urban growth, increased runoff, flood damage, and changes in property values to residents. 5. To analyze the efficiency of the property market over time to determine the effect of increased flood hazard on property values.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0019, THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES

J.P. BREADEN, Univ. of Kentucky, Water Resources Institute, Lexington, Kentucky 40506

**Abstract:** There is a need in water resources planning to develop a procedure for determining the time pattern in which flood damages occur as a function of the rise and fall of the flood hydrograph. The widely-used approach for estimation of flood damages does not take into account the fact that the frequency of the annual flood peak may not be the same as the frequency of the total annual flood control storage or for estimating the average annual damages for use in formulation of alternative flood control schemes.

Pub. 1973: 159p., NTIS No. PB-227 216/9: PC \$5.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0020, FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO

L.A. WAITE, U.S. Dept. of the Interior, Geological Survey, Albuquerque, New Mexico 87106

**Abstract:** On July 17, 1972 severe flooding occurred in Gallup, N.M. An isolated storm approximately nine miles east of Gallup covering 20 of the 558 square miles drained by the Puerco River was responsible. Floodwaters reached a peak gage height of 15.3 feet and peak discharge of 1200 cubic feet per second at the crest-stage gage located on the Puerco River in Gallup. Floodwaters damaged 120 residences, 48 businesses, and 11 public buildings and facilities. Total damages were estimated at \$1,293,000. Gallup was declared a disaster area by Governor Bruce King on July 20, 1972 and by President Richard Nixon on August 1, 1972.

Pub. Oct. 73: 9., NTIS No. PB-225 031/4: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0021, METEOROLOGICAL AND HYDROLOGICAL ANALYSIS OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD

H.S. GROPER, U.S. Dept. of Commerce, Weather Bureau, Garden City, New York 11530

**Abstract:** The paper describes the meteorological patterns that



6.0022,

rainfalls in New Jersey indicates that occurrences of very heavy rains are frequently associated with tropical disturbances. Flood damages, fatalities, warnings issued and areas of record river stages are summarized.

Pub. 1972. 15p., NTIS No. COM-73-10257: Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0022, THE METEOROLOGICAL AND HYDROLOGICAL ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS

A.S. KACHIC, U.S. Dept. of Commerce, Weather Bureau, Garden City, New York 11530

Abstract: Contents: Meteorological conditions; hydrologic conditions; (Precipitation analysis, River stages; Flood damages; Warnings issued; Casualties).

Pub. Jul 70: 42p., NTIS No. PB-194 222: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0023, FLOOD FREQUENCY AND HIGH-FLOW STUDIES

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Raleigh, North Carolina 27607

There is a need to improve existing flood-frequency reports by updating, using recently developed techniques. There is also a need to determine flood data and hydraulic properties applicable to specific sites. Such studies are needed at sites of bridges, water-supply dams and water-treatment plants, waste-treatment plants, streets, and at other points where flood crests occur.

(a) Update areal flood relationships as sufficient additional data and new techniques become available to significantly improve the accuracy of estimates of flood peaks. (b) Determine the hydraulic properties of specified stream sites or reaches. (c) Immediately following large floods, prepare reports describing the intensity and amount of rainfall, the resulting height, duration, extent and discharge of flooding, and damage.

(a) Statistically analyze annual peak discharges to determine the relation between recurrence intervals and peaks. Use multiple correlation, hydrographic analysis, and modelling techniques to develop areal relationships by which floods of specified recurrence intervals can be estimated from basin characteristics. (b) Use slope-conveyance and step-backwater studies to determine the hydraulic properties of sites or reaches. (c) Assemble available data and prepare short summary reports on intense floods. In case of very rare and intense floods, collect additional data such as peak discharge at miscellaneous sites, bucket surveys of rainfall, flood profiles, or damage surveys.

Areal and site flood magnitudes and frequencies were developed or updated using available reports and more-recent flood-peak data collected. Analyses and studies during the year were directed mostly toward meeting requests for flood data and study of hydraulic characteristics of highway bridge openings. Manuscript reports on floods in the state were prepared for insertion in the annual water-supply paper on floods.

Project will be continued. Special reports will be prepared to describe extreme floods, should they occur. A report listing

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off., Scranton, Pennsylvania

Abstract: Subsequent to the President's Declaration of the Major Disaster Area June, 1972, in the aftermath of Tropical Storm Agnes, the Department of Housing and Urban Development (HUD) earmarked funds for disaster recovery in the State of Pennsylvania. The project involves the principal activities of property acquisition, relocation assistance, demolition, rehabilitation, replanting, provision of new streets and other public improvements, and preparation of land for resale to private developers. Environmental impacts and adverse effects are discussed.

Pub. Jun. 73: 83p., NTIS No. FIS-PA-73-1085-D: PC \$6.25

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0025, MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off., Scranton, Pennsylvania

Abstract: Reading was one of many cities in the Northeast region that was flooded as a result of Hurricane Agnes in the summer of 1972. One area that was flooded has been designed as the Schuylkill Urban Renewal Project. The Riverfront Urban Renewal Project, also flooded, had been in execution for several years. The area east of the Riverfront Project was also flooded. It is part of the Reading Model Cities area. Those portions of the Model Cities area that were flooded were drawn into a flood disaster urban renewal project designated as Model Cities One. It is discussed in the Statement.

Pub. Jun. 73: 36p., NTIS No. FIS-PA-73-1082-D: PC \$4.00

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0026, PENN-SUSQUEHANNA URBAN RENEWAL PROJECT, HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-634C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off., Scranton, Pennsylvania

Abstract: The statement involves the approval and funding of an urban renewal program in Harrisburg, Pennsylvania. The project will be administered by the Redevelopment Authority of Harrisburg and the activities that will be carried out are enumerated. There are no major items of an adverse nature that would preclude the approval of the plan as represented in the draft EIS.

Pub. Oct. 73: 148p., NTIS No. FIS-PA-73-1633-F: PC \$9.50 MF \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0027, MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Special Recovery Office, Scranton, Pennsylvania

Abstract: The activities proposed in the three projects include all facets of urban renewal, including acquisition, demolition, relocation, rehabilitation, replanting, provision of new streets and other public improvements, and preparation of land for resale to private developers. Environmental impacts and adverse effects are discussed.

ject proposes primarily rehabilitation of existing structures in accordance with the requirements of the flood ordinance. The project in South Milton proposes the removal of disaster affected residential premises with a proposed reuse of minimum residential and an expanded industrial complex with additional parking areas and recreational activities. All of the projects and reuses are considered as reasonable accommodations between the hazards of reconstruction in flood prone areas and complete abandonment of the flood stricken community. They provide the most essential improvement on a cost benefit basis. The abandonment of the flooded areas and complete community relocation is not economically feasible and the cost would be prohibitive. Environmental impacts and adverse environmental effects are discussed.

Pub. Oct. 73: 101p., NTIS No. EIS-PA-73-1685-F: PC \$7.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0028, DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Special Recovery Office, Scranton, Pennsylvania

Abstract: The proposed downtown urban renewal project is in the presidentially proclaimed major disaster area resulting from tropical storm Agnes in June 1972. The project site of 207.73 acres, is the commercial center or downtown area of Wilkes-Barre. This area will be rebuilt by (1) removing flood damaged and structurally substandard structures, (2) restoring and improving public facilities, (3) improve traffic circulation, (4) improving and beautifying open space and parks, (5) providing better pedestrian movement and amenities, (6) strengthening residential uses in the northeast corner of the project and (7) anchoring commercial development in the downtown area. Environmental effects are described.

Pub. Nov. 73: 92p., NTIS No. EIS-PA-73-1751-F: PC \$6.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0029, KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Comm. Dev. Disaster Rec. Off., Scranton, Pennsylvania

Abstract: The Kingston urban renewal project is a disaster area caused by hurricane Agnes in June 1972. Primary objectives of the project are to remove flood damaged and structurally substandard structures, restore public facilities and services such as street repair, and storm and sewage drainage, rehabilitate flood damaged residential dwellings and commercial properties, and realign certain streets to discourage use of residential streets as thoroughfares. The project will have a very positive long term impact on the environment. No important adverse effects are expected.

Pub. Oct. 73: 113p., NTIS No. EIS-PA-73-1632-F: PC \$7.75 MF \$1.45.

Abstract: During analysis of ERTS-1 imagery for land use patterns a large impoundment of water was observed in a location that was normally farmland. Subsequent investigation revealed that the satellite had recorded the remaining floodwaters from a severe local rainstorm that had occurred four days prior to the overpass. The inundated area was measured using the automatic planimeter associated with the signal analysis and dissemination equipment located at the Remote Sensing Institute. The area measurement coupled with estimates of the land use and productivity of the region permitted an estimate of the crop damage loss for the inundated area.

Pub. Mar. 73: 15p., NTIS No. N73-21361: PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Natl. Aero. & Space Adm.

#### 6.0031, STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY

J.P. RILEY, Utah State University, Utah Ctr. for Wtr. Resour. Res., Logan, Utah 84321

This project involves the application of an urban hydrology model to the Olympus Cove area of Salt Lake County to provide predicted peak flow rates for storms of various recurrence intervals and degrees of urbanization. From the predicted flow rates and urbanization data, flood damage is estimated. Alternatives for reducing flood damage are also suggested. The information will be used by Salt Lake County planners to plan for the safe urbanization of the Olympus Cove area.

SUPPORTED BY Salt Lake County Government - Utah

#### 6.0032, NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I

A. SACHS, Inst. for Defense Analysis, Arlington, Virginia 22202

Abstract: The paper describes a prototype natural disaster operations plan for slowly developing natural disasters such as hurricanes, floods, or forest fires. An investigation was concerned with the emergency operations of local jurisdictions (municipalities or counties) and of the state pertaining to natural disasters. It considered the interactions among these jurisdictions from the initial organization and training phase through mobilization of local forces and evacuation, to eventual return and rehabilitation of the evacuees.

Pub. Jul. 72: 105p., NTIS No. AD-749 032: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### DISASTER MITIGATION

#### 6.0033, SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA

UNKNOWN, U.S. Army, Engineer District, Mobile, Alabama 36601

Abstract: The project will initiate land acquisition and construction of a 211 foot high dam, 2,000 feet long for the purpose of impounding waters of the Flint River to provide flood control, hydroelectric power generation, recreation, and flow

In Alabama, as elsewhere in general, there exists a conspicuous need for flood-frequency information for small watersheds. This information is required for reliable hydraulic design of small drainage structures and for proper flood plain utilization. The urgency of the need precludes the establishment of a long-term data collection program; thus, a method for deriving the flood-frequency information in a shorter time period is required.

The objective of this project is to develop a method for computing flood-frequency information for small watersheds throughout Alabama. It will not be practical to gage more than a small percentage of the large number of potential sites; thus, the method must be applicable to both gaged and ungaged sites.

The project will proceed through three phases. First, define the functional relation between rainfall characteristics and peak flow on the basis of concurrent records of rainfall and runoff at about 60 sites; second, using the rainfall-peak flow relation and long-term records of rainfall synthesize long-term flood-frequency curves for the gaged sites; third, extend the results areally to ungaged basins on a statewide or regional basis utilizing multiple-regression techniques.

Routine data collection was continued at 19 rainfall flood-hydrograph stations and at 20 crest-stage gages. A progress report was completed which included a method for estimating flood characteristics of small watersheds in Alabama and a summary of work accomplished since 1967.

Data collection will be continued at project stations and two new stations will be established.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0035, ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA

D.B. KNOWLES, State Geol. Survey, University, Alabama 35486

**Abstract:** The water-resources situation in Alabama has many facets ranging from water supply to waste disposal, from floods to droughts, and from navigation to recreation. Within this wide range of topics two common elements have been selected for consideration in this administrative report—all are intimately related to the hydrologic cycle, and all involve significant areas wherein the knowledge and data are inadequate. Accordingly there is first presented a discussion of the hydrologic cycle to provide a background of understanding. This is followed by a discussion of the types of data and studies that are required for a better understanding of the many problems that face those who seek finite answers in one or more of the facets of Alabama's water-resources situation with recommendations for needed supplemental or additional studies.

Pub. Aug. 70: 31p., NTIS No. PB-214 181/0: PC \$3.75 MF \$0.95.

SUPPORTED BY No Formal Support Reported

#### 6.0036, WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS

M. SNIEDOVICH, Univ. of Arizona, Graduate School, Tucson, Arizona 85721

**Abstract:** A methodology is developed for the evaluation of the worth of the hydrologic data for short-term forecasts of floods. The effectiveness of the forecasts is measured in

warning time, forecast error, response of the population, and hydrometric network on the end product of the system—that is, the social and economic improvement of the flood plain. An adequate evaluation, especially concerning the potential worth of the hydrologic data, requires a multi-disciplinary study involving hydrologists, economists, sociologists, psychologists and flood plain authorities. In the light of continuous improvement in the scientific and technologic aspects involved in the forecasting system there is a need for a continuous reevaluation of the forecasting system as a potential alternative in flood control projects especially as a complementary alternative to the classical ones such as zoning and structures.

Pub. Jul. 73: 100p., NTIS No. COM-73-11773/1 PC \$7.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - NOAA

#### 6.0037, HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES

L.R. BEARD, U.S. Army, Hydrologic Engineering Center, Davis, California 95616

**Abstract:** The volume is the first of a projected 12 volume report entitled, 'Hydrologic Engineering Methods for Water Resources Development'. The report is being prepared by The Hydrologic Engineering Center as part of the U.S. Army Corps of Engineers participation in the International Hydrological Decade. Volume I describes the general nature of water resources improvements and the general procedures used in hydrologic engineering studies. The types of water resources improvements covered in this volume include local flood protection, flood control by reservoirs, water supply by reservoirs, hydroelectric power developments, multipurpose reservoirs, and water resources systems. As a part of this volume, three generalized computer program descriptions covering different phases of hydrologic engineering are included.

Pub. Oct. 71: 586p., NTIS No. AD 758 904 PC \$6.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0038, RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL

H.S. EICHERT, U.S. Army, Hydrologic Engineering Center, Davis, California 95616

The rapid increase in complexity of water resources planning studies that has taken place during the past 20 years has resulted in a need for more comprehensive project analysis.

The ultimate goal of this research project is to develop a methodology that utilizes the capability of the computer to analyze complex systems of water resource projects in order to make adequate evaluations of alternative projects in the degree of detail required to meet desired objectives. This will require economic and social analyses in addition to hydrologic analyses of projects under a wide range of operation conditions.

Developmental work on a flood control system simulation model will be continued. The development of a comprehensive single reservoir simulation model will be undertaken. It is anticipated that the model, when completed, will be suitable for analysis of reservoir operation for both flood control and the full range of water conservation purposes. Work on a

procedure for systematically evaluating and screening alternatives in kind early in the planning process will be initiated.

SUPPORTED BY U.S. Dept. of Defense - Army

# 6.0039, EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA

M.W. BUSBY, U.S. Dept. of the Interior, Geological Survey, Garden Grove, California 92643

Urban development and water use in the upper Santa Ana Valley have affected peak flows and total runoff to an undetermined degree. Long-term planning involves data derived from frequency analyses of streamflow characteristics. Hence, an evaluation of the effect of development and use is required to improve the analytical procedures.

A data collection and study program to estimate the effects of urban development and increasing water use on the surface flow regimen of the Santa Ana River at several key gaging stations, including Prado Dam, Riverside Narrows, and 'E' Street near San Bernardino. For peak flows and total runoff, an attempt would be made to reconstruct the historic records of streamflow under present conditions of development and under conditions of development expected by 1990, as stipulated by local planning agencies, including the flood control district, U.S. Army Corps of Engineers, and several municipal water districts and water agencies.

Assembly of all available data related to urban development and changing land and water use in project area. Storm hydrography analyses will be made to develop hydrograph characteristics for periods before, during, and after urbanization. These characteristics will then be related to urban development factors and interpreted to meet project objectives.

Calibration of several hydrograph models started.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0040, ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME II, APPENDICES

UNKNOWN, W.A. Wahler & Associates, Palo Alto, California 94303

**Abstract:** On February 26, 1972, a coal refuse dam, owned and operated by the Buffalo Mining Company, failed near Saunders, W. Va. The resulting flooding of the Buffalo Creek Valley had national ramifications. The immediate consequences of the flooding were the deaths of 118 persons and 7 reported missing, the loss of over 500 homes, and extensive flood damage to other property in Buffalo Creek Valley. Basic data were gathered during the investigation of the Middle Fork Valley dams and refuse bank above Saunders during field investigations of the site conducted from the end of March through mid-September 1972. The information consisted of field mapping, subsurface exploration and sampling by means of auger drill holes, field density tests, field permeability tests, aerial photography, vane shear tests, and cone penetration tests. Volume II, the appendices, covers these details.

Pub. Feb. 73: 198p., NTIS No. PB-215 143/9: PC \$6.00 MF \$0.15

**Objective:** Gain understanding of runoff and erosion processes of steep, unstable mountain chaparral watersheds and their contribution to downstream floods and sedimentation. Develop effective land management practices to combat excessive runoff and erosion, as emergency following fires and for long-term environmental stability.

**Approach:** Excessive post-fire erosion attacked by studying hydrophobic soils, their chemo-physical nature and relations and tests of measures to counteract them. Long-term environmental stability sought by ecological approach, including study of site potentials. Relationships between storms and floods studied by investigation of processes, and development of estimation techniques through analyses of existing watershed data.

**Progress:** Soil water repellency is a frequently encountered site factor that can influence the success of various forestry practices. Severe water repellency is usually the result of fire, but humus and its related microorganisms may also produce repellency. Water repellency may induce excessive runoff and erosion in a burned area. Water repellency also affects relations between soil, water and plants. Adverse effects of water repellency can be eliminated by mechanically disrupting the water-repellent barrier. Under some conditions, treating the affected areas with wetting agents may soon be feasible. A survey of water-repellent conditions is desirable for appraisal of a forest site for various cultural practices. A wetting agent was applied by sprinkler irrigation to a burned watershed as an erosion control measure. The wetting agent decreased production of mustard (*Brassica* spp.) and increased production of annual ryegrass (*Lolium* spp.). When the wetting agent was applied, the soil surface was more moist and more favorable for seedling establishment which favored grass over mustard. A laboratory experiment indicated that the wetting agent suppressed production and growth of mustard seedlings and had a less suppressive effect on ryegrass seedlings. The differential phytotoxicity was presumably responsible for much of the difference between grass and mustard seedling establishment in the field.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

# 6.0042, SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT

UNKNOWN, Council on Intergov. Relations, Sacramento, California 95814

**Abstract:** A technical supplement to the San Geronio Pass General Plan is presented in relation to such problems as inadequate roadways, flood threat, fear of brush fires, wildfire damage, and unsightly utilities. It includes elements for physical features, solid and cultural aspects, environmental quality, housing, economics, land use, public facilities and services, circulation and transportation, and government fiscal concerns.

Pub. Aug. 71: 197p., NTIS No. PB-210 872: PC \$12.00 MF \$0.95.

SUPPORTED BY Riverside County Govt. - Cal.

# 6.0043, FLOODS FROM SMALL DRAINAGE AREAS CALIFORNIA

A.O. WAANANEN, State Dept. of Transportation, Sacramento, California 95814 (2R23220113)

6.0044.

homogeneous hydrologic regions. More than 300 crest-gage stages have been established. In addition, continuous water-stage and precipitation-recording gages are installed at a given site for a period long enough to establish the rainfall-runoff relation.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**6.0044, SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-DURATION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA**

*J.D. GOODRIDGE, State Dept. of Water Resources, Sacramento, California 95802*

California's South Coastal Basin is the location of the heaviest rainfall intensity in the State. Local agencies of the South Coastal Basin have pioneered in data collection for use in evaluating flooding hazards.

The objectives of this report are: (1) to provide a summary of the records of extreme precipitation and (2) to illustrate a method of using the results of a one-hour extreme annual storm to develop the annual storm for shorter durations.

The information provided here consists of a uniform approach to determining the frequency of precipitation events of various magnitudes. It provides a method for interpolating between weather stations to obtain rainfall values for use in estimating runoff from small watersheds. This analysis will provide the basis for a state-wide study of the frequency of rainfall events for durations of less than one hour.

SUPPORTED BY California State Government - Sacramento

**6.0045, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

*J.T. ALFORE, State Div. of Mines & Geology, Sacramento, California 95814*

**Abstract.** This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: PC \$7.75 MF 1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0046, DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SAN DIEGO**

*G.S. NOLTE, San Diego Co. Comp. Plan. Org., San Diego, California*

This study identifies the drainage and flood control problems of the San Diego region, as well as provides an up-to-date inventory of existing drainage and flood control facilities.

flood control problem; and suggests some seven alternative organizational arrangements for carrying out control work for the region. Volume II describes CONS, a computerized method for the systematic analysis of urbanization's effects on design and costs of flood control facilities.

The findings of this study are contained in three sections: Volumes I, II, and a Summary Report.

Pub. May 70: NTIS on San Diego Co. Comp. Plan. Org., Co. Admin., 1600 Pacific Highway, San Diego 92101.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0047, INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN - SAN DIEGO COUNTY - UNKNOWN, San Diego Co. Comp. Plan. Org., California**

The Initial Plan Report consists of two reports: A and B. Report A is a technical. The Summary Report presents goals for the provision and extension of water, sewerage, and flood control facilities and service. The Summary Report presents a summary of an evaluation of the adequacy of present facility systems to meet present and projected needs, as well as a list of proposed projects, based upon this evaluation. Recommendations for water supply planning, implementation, and governmental responsibility and organization in this context, is also presented.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0048, FLOOD FREQUENCY IN URBAN AREAS - COLORADO**

*G.L. DUCRET, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225 (CO68-031-C)*

This research is part of the program of water resource investigations conducted by the U.S. Geological Survey in cooperation with State and local agencies in Colorado.

**Purpose:** To collect data in type areas and develop rainfall-runoff relations that can be extrapolated to all urban areas in the metropolitan areas of the 6 county area around Denver.

**Methods:** Rainfall and runoff data will be collected from four drainage basins in the 6 county area. The basins are selected to sample the following ranges in basin area: (a) Size: 40 acres to 10 square miles, (b) Cover: completely impervious; (c) Drainage: urbanized, completely sewered to non-sewered; (d) Development: Non-urbanized, the natural basins being subject to development perhaps 15 years.

Rainfall data will include continuous records of rainfall at one or more sites in each basin, supplemented by standard rain gages. The runoff data will include continuous records of outflow from each basin, supplemented by crest gages to record peak stages and recessions in the basin. Because of the expected rapid changes in the basin, the gages will have a time scale that accurately record changes during time intervals as short as minutes.

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey, Water Resources Division in cooperation with Colorado Department of Highways.

**Purpose:** To collect data and develop techniques for estimating the magnitude and frequency of floods on small watersheds. Emphasis will be on providing the greatest degree of accuracy on watersheds crossing the State Highway network where the information will be of economic significance in the design of hydraulic structures such as bridges and culverts.

**Methods:** Data for this project will be collected from about 55 new stage-rainfall recorder installations distributed geographically so as to sample typical hydrologic environments. Data from the present streamflow network and from the Weather Bureau's precipitation network in Colo. and adjoining States will be included in the analysis. Fieldwork will consist of reconnaissance trips to select sites, installing gages, servicing recorders, making measurements of flood flows, and determining watershed parameters. Office work will consist of research on technique development and on data processing.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 6.0050, FLOOD PROTECTION AT CULVERT OUTLETS

**D.B. SIMONS**, Colorado State University, School of Engineering, *Fort Collins, Colorado* 80521

**Abstract:** Techniques for the design of stable rock-riprap protection in the vicinity of bridge crossings are computed from methods derived in other sources, and the properties are related to particle sizes for riprap protection of abutments and piers. Design steps for prototype bridge crossings are enumerated so that the hydraulic engineer may use this report as a design manual. An example of the design protection for a prototype bridge crossing is included to clarify the suggested design procedures. Riprap-protected spill-through abutments were constructed in the hydraulic facilities at Colorado State University in order to test the validity of the suggested design procedures. The results of this research will become the standard for establishing erosion protection required at bridges.

**Pub** 1970: 232p., NTIS No. PB-196 972: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Transportation - F.H.A.

#### 6.0051, A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION

**R.F. MINNEHAN**, Univ. of Delaware, Division of Urban Affairs, *Newark, Delaware* 19711

**Abstract:** A set of local water resource problems were studied: upstream runoff control and downstream flooding, temporary sewage treatment plants, and choice of a regional waste water handling system. The study focus was on a preliminary test of four hypotheses about the process of design and decision-making. These hypotheses include: That for some situations a combination of privately and publicly constructed and financed conservation measures may be a more efficient choice than public actions alone and that the specific availability of funds and/or financing procedures may distort or bias the choice between alternative water conservation systems. These hypotheses and their application to the case studies are discussed using verbal cost-benefit arguments to show why

#### COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD

**UNKNOWN**, Internat. Joint Commission, *Washington, District of Columbia* 20440

The purpose of this study are: (1) to review the various factors affecting the fluctuations of the water levels of the Great Lakes; (2) to determine the feasibility of regulating further the water levels in the Great Lakes and connecting channels so as to bring about a more beneficial range of stage and other improvements for the purposes enumerated in the Reference; (3) to determine the changes in existing works or other measures within the basin needed to accomplish such regulation that would be practicable and in the public interest; (4) to provide an estimate of the costs of such measures; and (5) to indicate the probable effects, beneficial or adverse, in each country of any regulation plans or measures proposed. The study considers all major interests affected by the water levels of the Great Lakes.

**Pub** Dec. 73: 294p., No copy info. Available.

**Abstract provided by** FDAA.

**SUPPORTED BY** No Formal Support Reported

#### 6.0053, CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION

**C.P. LINDNER**, U.S. Army, Corps of Engineers, *Washington, District of Columbia* 20310

**Abstract:** The report, prepared by the Committee on Channel Stabilization and its consultants, for the U.S. Army Engineer District, Alaska, presents the requested opinions of the Committee concerning channel stabilization problems involved in evaluating the several alternate plans for regulating the Chena and Tanana Rivers to provide protection for the City of Fairbanks, Alaska, from floods.

**Pub** Mar. 73: 31p., NTIS No. AD-758 443: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

#### 6.0054, JACKSON HOLE FLOOD CONTROL PROJECT

**UNKNOWN**, U.S. Army, Corps of Engineers, *Washington, District of Columbia* 20310

**Abstract:** The report, prepared by the Committee on Channel Stabilization and its consultants, for the U.S. Army Engineer District, Walla Walla, presents the requested opinions of the Committee concerning flood control and channel stabilization improvements on the Snake River in the Jackson Hole, Wyoming, area.

**Pub** Mar. 74: 18p., NTIS No. AD-777 796/4: PC \$3.00 MF \$1.45.

**SUPPORTED BY** U.S. Dept. of Defense - Army

#### 6.0055, HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE

**UNKNOWN**, U.S. Dept. of Agriculture, Soil Conservation Service, *Washington, District of Columbia* 20250

**Abstract:** The project is for watershed protection, flood prevention and municipal water storage in Humphreys and Dickson Counties, Tennessee. The project includes conservation land treatment measures supplemented by seven floodwater re-

6.0056.

roads and bridges 93 percent and flood plain scour damage by 78 percent. In addition, there will be a reduction in inconveniences like closed roads, and reduced suspended sediment in the creek by 16 percent. About 344 new industrial and rural on-farm jobs will be created by the project.

Pub. Sep. 73: 51p., NTIS No. EIS-TN-73-1466-F; PC \$4.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Agriculture

#### 6.0056, BLACK HILLS FLOOD OF JUNE 9, 1972

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

The morning after the disastrous flood swept through the canyons and valleys of the Black Hills of South Dakota, a survey team was dispatched to the devastated area to review the effectiveness of NOAA's warning service and to identify weaknesses that require remedy. This report-The Black Hills Flood of June 9, 1972-presents the findings and recommendations of the Survey Team.

Pub. Aug. 72: 20p., Natural Disaster Survey Rpt. 72-1, U.S. Dept. of Comm., NOAA

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0057, ESSA AND OPERATION FORESIGHT

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

A report on ESSA's performance before and during the heavy floods in the Midwest, March-April 1969, based on a survey of how ESSA's River and Flood Forecast and Warning Service performed during the disastrous flood situation that was occurring in the Midwest. This report is a review of the effectiveness of forecasts and warnings prior to and during the disaster.

Pub. May 69: 44p., ESSA/PI 690030, U.S. Dept. of Comm., ESSA

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - E.S.S.A.

#### 6.0058, FLOOD FLOWS FROM SMALL DRAINAGE AREAS

J.D. CAMP, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R23007618)

The objective of this study is to provide information that will aid in the scientific design of small drainage structures. The study consists of a field sampling of floods from appropriate areas in Illinois, an analysis of the resultant data, and the development therefrom of information that will permit a more accurate designing of waterway openings for small drainage structures. Crest-stage indicators and water-stage recorders have been installed at a number of sites and periodic observations are being made.

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SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0059, INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO

W.P. CROSS, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R23012814)

#### 6.0060, INFLOW HYDROGRAPH STUDY - WYOMING

R. CUSHMAN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

The magnitude and frequency of flood volumes to be expected from small drainage areas in Wyoming are to be defined, and also, the characteristic shape of flood hydrographs in relation to the physical characteristics of the basins. A rational method of accounting for the effect of embankment storage which will be useful in culvert design is to be developed. Hydrologic data (stream flow and precipitation) will be obtained for about 50 different basins. Data on stream length, slope, stream density, size of drainage basin, soil type, basin shape, and other factors will be compiled for each basin. Aerial photographs were adequate, or standard surveying methods, if necessary, on small drainage basins will be utilized. The feasibility of using climatic data to extend to long flood records for a basin will be investigated, and also, the relation between rainfall frequency and runoff volume frequency. Assuming that rainfall frequency is defined by long term records and that general rainfall-runoff volume relations can be defined by the data obtained in this investigation, the frequency of flood peaks can be approached through time lag characteristics. The chosen approach to definition of the effect of embankment storage in reducing flood peaks requires definition of the time lag characteristics of the basin and the relation between outflow and storage at the culvert size. Time lag characteristics are being defined for each of the 50 basins as both rainfall and the flood hydrograph are being measured. Time lags are then related to the physical characteristics of the basin such as length and slope to provide a general method to be used in design. Data on stream length, slope, stream density, size of drainage basin, soil type, basin shape, and other factors are being compiled for each basin.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - FHWA

#### 6.0061, PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS

L.E. SCHROEDER, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R23015814)

Hydrologic data, which can be used in the hydraulic design of highway drainage structures, is being obtained and analyzed. The magnitude and frequency of floods for drainage areas ranging from one to 20 square miles are being determined. There will be a minimum of about 150 flood hydrograph recording stations. Texas has been divided into 18 hydrologic regions for large basins. The small basin gage sites will be selected to insure adequate sampling of flood discharges in each hydrologic region, giving consideration to surface geology, physiographic & topographic features and other factors.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - FHWA

#### 6.0062, FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WEST HOPE, NORTH DAKOTA

J.O. SHEARMAN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Prolonged drawdown releases from Burlington Dam, an authorized Corps Of Engineers project on the Souris River in

be made at long-term gaging stations near Bantry and Westhope, N. Dakota.

Reservoir releases furnished by the St. Paul District Corps Of Engineers will be routed downstream and combined with observed tributary inflows. A daily streamflow routing technique based on the continuity principle will be used to route and combine flows.

Developed flow routing model for Souris River below Burlington Reservoir. Using release rates to 300 cfs and 500 cfs, the 1969 flood and estimated 50, 100, and 150 year recurrence interval floods were routed through the model to determine flow characteristics downstream. Computations furnished to Corps Of Engineers.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0063, FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO

C.A. THOMAS, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R23082864)

Flood frequency, magnitude and hydrologic characteristics of small drainage areas are being determined in Idaho.

Document provided to SSIE by the Highway Research Information Service.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0064, COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

All data regarding stream flow and floods on streams in Iowa are being collected and analyzed. Peak discharges are determined at gaging stations and frequencies of the peak elevation of the water surface are determined at various points along streams.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Iowa State Government - Des Moines

#### 6.0065, FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI

K.V. WILSON, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

The flood-discharge frequency relations are being determined for streams draining five square miles or less in the state of Mississippi.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0066, AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA

J.E. REYNOLDS, Univ. of Florida, School of Agriculture, Gainesville, Florida 32601

The operating procedures for many multipurpose water management systems are prescribed by operating rule curves which were developed with flood control as their single purpose. Operation by such rigid rule curves often result in less than optimum allocation of water.

The purpose of this study is to develop and empirically test a model for determining the optimal temporal allocation of

activities b. Physical, political, and institutional restrictions on water use. c. Allocation between and within watersheds. d. Allocation between time periods. 2. Empirically testing the model in the Kissimmee River Basin: a. Develop homogeneous soil classes based on their response to supplemental water. b. Estimate the value of water in the alternative uses. c. Estimate rainfall, runoff, stream flows, seepage, evaporation and irrigation return flows. d. Determine physical, political and institutional restrictions. e. Apply data to model and determine optimum allocation. 3. Alter the restrictions on water use to determine the effect on the optimum allocation of water. 4. Compare advantages and disadvantages of linear programming and simulation models for water management systems.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0067, HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS)

H. KLEIN, U.S. Dept. of the Interior, Geological Survey, Miami, Florida 33130

Changes in hydrology and biology brought on by rapid urbanization in western Big Cypress Swamp are of concern to planning and water supply agencies, because an eastward extension of urban growth could affect not only the adequacy of future supplies but also the ecosystem of the Big Cypress and the northwestern part of Everglades National Park. Agencies must develop policies based on knowledge of the environment so that water resources can be protected and damage to the environment be minimized.

Determine changes in the environment that have taken place as a result of urbanization in the western part of basin and apply knowledge to development of eastern part. Describe alternative methods of flood protection, developing water supplies, controlling pollution.

Determine areas of high yield and water quality in shallow aquifer through test drilling. Prepare series of water level maps to determine recharge areas. Prepare maps of flow distribution, areas of inundation, areas affected by sea-water intrusion, and areas of inferior water quality.

1) Vegetation map prepared for all but western part of Big Cypress. 2) A land use map of Big Cypress, prepared from 1970 aerial photos showed 2,000 of the total 2450 sq. miles was undeveloped; 200 sq. miles was agricultural; and 205 sq. miles was residential or proposed residential. 3) A fairly thick, permeable aquifer in central Big Cypress probably has the potential of serving the foreseeable future municipal water demands for the lower Gulf Coast. 4) Surface runoff ranged from 3500 CFS, November 1969 to zero, during the 1971 drought.

Monitoring 9 ponds, sloughs, canals for complete water quality near sites of proposed oil well drilling to be continued.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0068, RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA

H.A. PITT, U.S. Dept. of the Interior, Geological Survey, Miami, Florida 33130

The permeability of the Biscayne Aquifer and the degree of interconnection between the aquifer and the canals are major hydrologic factors in flood control in Southeastern Florida. Canal-aquifer interconnection is excellent in Dade County, but it becomes progressively poor in Broward County where the upper part of the aquifer contains fine materials of low permeability. Because of the different hydrologic charac-



6.0069.

teristics, operation of control structures in canals in areas of good interconnection will be different from the operations where interconnection is poor.

Details of the hydrologic characteristics of individual canal basins must be known for optimum management of the water resources. Some basic hydrologic information is available for C-9 (Snake Creek Canal), C-6 (Miami Canal) and C-2 (Snapper Creek Canal) in individual investigative reports. The results of the study will aid in determination of the secondary or tertiary canal drainage required in flood control.

The plan is to investigate and evaluate the response of ground-water levels and canal levels in interior areas to operations of coastal salinity control structures and inland secondary control structures in selected primary canals. Tests will be made in canal systems in three different geologic environments. During the tests water levels will be measured in shallow observation wells at different distances from the primary and/or interconnected secondary canals.

Tests were completed in the Pompano Creek Canal Basin and levels were run to all date points. Analysis of the data for all three tests was completed and a final report was prepared. This completes the effort on this report.

Final report to be reviewed and approved.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0069, HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Miami, Florida 33130

Water resources in Southeastern Florida, particularly in Dade County, are becoming increasingly influenced by water-management practices of the Central and Southern Florida flood control district. With the expanding urbanization there is a growing need for fresh water supplies, flood control, and water conservation.

To prepare an annual report summarizing hydrologic conditions in Dade County as urbanization continues at a record pace; and to assist local agencies in specific water-management problems.

Basic data are collected under separate projects. These data will be analyzed periodically to determine the effects and the needs of water management in the county. The annual report will contain basic data concerning fluctuations of the water table and discharges of canals. Water-table maps of the county as well as those of the city of Miami's well fields will be shown for comparison with previous conditions. Graphs and maps showing the distribution of saline water will also be included. Specific hydrologic problems will also be investigated and reported upon.

Annual summary was prepared for 1971 and work on the 1972 summary is in progress. Recommendations for new construction to update monitoring networks were made to local cooperators. Effects of the 1971 drought were discussed in the summary report.

Preparation of summary for 1972.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0070, STUDIES OF THE RED ALGAE IN BISCAYNE

found to be very important among the primary and thus to the food chain, in ten years of field and South Florida estuaries, which studies chiefly deal with macroinvertebrate population. The *Laurencia* community is intimately connected with the ecology of the animals, serving as shelter as well as probable food source. However, the *Laurencia* itself has been undertaken to date and nothing is known of its ecology. It is now necessary to determine the growth rates and major ecological factors affecting the occurrence and distribution of *Laurencia*. The appearance and/or disappearance of this genus probably will provide a sensitive indicator of pollution, which, if used in conjunction with animal and microalgal indicators will give criteria for many types of pollution in our estuaries.

How information will be applied: *Laurencia* and *Digeia* are to be major contributors to the detrital food web in Biscayne Bay-Card Sound. Data will be used to establish safe limits for flood control canal design and outfalls for various industrial plants. The organizations expected to use this information are as follows: U.S. Army Corps of Engineers - for dredging and filling; Environmental Protection Agency - industrial outfalls; Dade County Pollution Control Agency - industrial outfalls; Florida Power and Light Co. - heat effluent; Florida Power Corporation - heat effluent; State of Florida - industrial outfalls; Westinghouse Corporation - desalination plants; Atomic Energy Commission - heat and heat outfalls.

Accomplishments during the past twelve months: 1) Distribution of grass community dynamics, 2) Delineation of plant outfall on grass and algal population, 3) Baseline data on ecology of major green macroalgae.

For additional information pertaining to this project contact: Richard G. Bader, Director, Sea Grant Programs, University of Miami, Coral Gables, Florida 33146

SUPPORTED BY U.S. Dept. of Commerce - NOAA

#### 6.0071, ESTUARINE HYDROLOGY OF TAMPA BAY, FLORIDA C.R. GOODWIN, U.S. Dept. of the Interior, Geological Survey, Tampa, Florida

A comprehensive hydrological investigation of Tampa Bay and its immediate surroundings is necessary to assess the probable effects of a proposed channel dredging project on the interacting hydraulic, chemical and biological systems operating in the bay. Unanswered technical questions concerning possible ground-water contamination, modified flood circulation characteristics, and overall environmental impacts, as well as operational needs, such as quantity and location of dredged material, justify this project.

The specific objectives of this study are: (1) bathymetric mapping of the bay bottom, (2) determination of the geology and bedrock, (3) definition of pollutant sources issuing from the bay and their subsequent distribution, (4) development of a management tool to predict the response of the bay to natural and man-made changes - dredging, filling, hurricanes, etc., (5) determination of optimum channel dimensions, quantity of material to be removed, and optimum location and shape of disposal sites.

The following techniques will be used to accomplish the objectives: (1) bay bottom mapping by negative-bathymetry.

## MAJOR DISASTER TYPES

6.0075,

data (velocity, elevation, quality), (5) optimum dredge operation and fill placement determined by using model to test all suggestions.

Fourteen tide gages operating; monthly and quarter QW monitoring programs established; Weather Bureau data being received monthly; bottom contour maps under topographic division review; digital model nearing completion of development period; data reports in preparation; 800 miles of depth data collected along ship channel and other areas.

Completion of stage, QW, seismic data reports; preparation of interpretive report; computation of types and quantity of material proposed to be removed from ship channel; completion of digital model; use of model to predict effects of proposed activities.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 6.0072, ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT

*UNKNOWN*, East Cent. Florida Reg. Coun., Titusville, Florida

Abstract: The study is designed to guide the future design of an engineering system for flood prevention in Orange, Seminole, and Osceola Counties. Emphasis is placed upon preserving and utilizing natural water flow and water storage patterns wherever possible. Existing engineering studies are reevaluated and suggestions made for future engineering designs. The analysis is carried out for thirty-four (34) watersheds in the three county area.

Pub. Feb. 70: 77p., NTIS No. PB-191 246: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0073, CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III

*L.D. JAMES*, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332 (C-2064)

The proposed research is the third and final phase of a case study of water resources management in an urban area, with special emphasis on flood hazards and flood damage abatement alternatives. Phases I and II were concerned primarily with a review and evaluation of basic hydrologic, economic, and demographic data; a study of legal and institutional constraints on flood management in the case study area; and the development and testing of hydrologic-economic and socio-economic models which will reflect significant characteristics of the study area. Emphasis was and will continue to be placed on generalized research methodology - not on the development of an action program for the 'solution' of the case study problem.

Phase III will be concerned with the refinement and testing of models and analytical procedures developed in the previous phases. Tests will be extended to include comparable watersheds. Additional objectives include the determination of the kind, amount, quality, cost, and relative significance of the data which are needed for flood management studies.

The objective of the proposed research is to analyze critically five watershed models with data from four hydrologically dissimilar Georgia watersheds. Over the past decade, several digital computer programs have been written to model the continuous response of a watershed to precipitation and evapotranspiration. Although each model has been applied to several watersheds, in very few cases have different models been applied to the same watersheds for quantitative comparison of results.

These models are important tools in the design and analysis of land-use and water resources control structures. Better methods for the synthesis of design floods for flood control structures, flood plain management, urban drainage, and highway culvert design are needed. The hydrologic effects of urbanization and the effects of urbanization and the effects of forest and range management practice on the water resource are best quantified through the use of watershed simulation models.

Hourly precipitation and daily streamflow and pan evaporation data will be obtained, adjusted, and placed on drum file for eight year periods for four Georgia watersheds. Parameters of the five selected models will be determined using the first four years of data and optimization routines. Four additional years of streamflow will be predicted with each model and compared with measured streamflow.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

### 6.0075, FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA

*H.G. GOLDEN*, U.S. Dept. of the Interior, Geological Survey, Atlanta, Georgia 30309

Previous and continuing studies have defined the flood magnitude-frequency relationship of streams having drainage areas larger than 20 square miles. Practically no reliable information is available for areas smaller than 20 square miles. Economic, safe design of highway drainage structures must, along with other considerations, be based on a knowledge of the magnitude and frequency of floods. This knowledge can only be attained through collection and analysis of factual data from many representative streams chosen on the basis of areal distribution, drainage area size, and a variety of other parameters which may significantly affect peak rates of flow.

The objective of this investigation is to collect the necessary basic data and to analyze those data to develop relationships which may be used to determine flood-frequency characteristics of any small stream in the state.

Streamflow and rainfall data that are collected from 115 strategically located sites will be used to define various components for a digital-computer model of the rainfall-runoff process. Long-term records of flood peaks will be computed by using weather bureau long-term rainfall records as input to the model. Flood-frequency curves will be defined for each data site. Discharge values corresponding to specific recurrence intervals will be taken from these curves and correlated with significant physical and climatic basin characteristics.

teristics, operation of control structures in canals in areas of good interconnection will be different from the operations where interconnection is poor.

Details of the hydrologic characteristics of individual canal basins must be known for optimum management of the water resources. Some basic hydrologic information is available for C-9 (Snake Creek Canal), C-6 (Miami Canal) and C-2 (Snapper Creek Canal) in individual investigative reports. The results of the study will aid in determination of the secondary or tertiary canal drainage required in flood control.

The plan is to investigate and evaluate the response of ground-water levels and canal levels in interior areas to operations of coastal salinity control structures and inland secondary control structures in selected primary canals. Tests will be made in canal systems in three different geologic environments. During the tests water levels will be measured in shallow observation wells at different distances from the primary and/or interconnected secondary canals.

Tests were completed in the Pompano Creek Canal Basin and levels were run to all date points. Analysis of the data for all three tests was completed and a final report was prepared. This completes the effort on this report.

Final report to be reviewed and approved.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0069, HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Miami, Florida 33130

Water resources in Southeastern Florida, particularly in Dade County, are becoming increasingly influenced by water-management practices of the Central and Southern Florida flood control district. With the expanding urbanization there is a growing need for fresh water supplies, flood control, and water conservation.

To prepare an annual report summarizing hydrologic conditions in Dade County as urbanization continues at a record pace; and to assist local agencies in specific water-management problems.

Basic data are collected under separate projects. These data will be analyzed periodically to determine the effects and the needs of water management in the county. The annual report will contain basic data concerning fluctuations of the water table and discharges of canals. Water-table maps of the county as well as those of the city of Miami's well fields will be shown for comparison with previous conditions. Graphs and maps showing the distribution of saline water will also be included. Specific hydrologic problems will also be investigated and reported upon.

Annual summary was prepared for 1971 and work on the 1972 summary is in progress. Recommendations for new construction to update monitoring networks were made to local cooperators. Effects of the 1971 drought were discussed in the summary report.

Preparation of summary for 1972.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0070, STUDIES OF THE RED ALGAE IN BISCAYNE BAY

found to be very important among the primary and thus to the food chain, in ten years of field South Florida estuaries, which studies chiefly the macroinvertebrate population. The Laurencia community is connected with the ecology of the animal shelter as well as probable food source. However, the Laurencia itself has been undertaken to date, nothing is known of its ecology. It is now necessary to determine the growth rates and major ecological factors affecting the occurrence and distribution of Laurencia. The and/or disappearance of this genus probably will be a sensitive indicator of pollution, which, if used in conjunction with animal and microalgal indicators will give criteria for many types of pollution in our estuaries.

How information will be applied: Laurencia and Diga are to be major contributors to the detrital food web in Biscayne Bay-Card Sound. Data will be used to establish safe limits for flood control canal design and outfalls for various industrial plants. The organizations that will use this information are as follows: U.S. Army Corps of Engineers - for dredging and filling; Environmental Protection Agency - industrial outfalls; Dade County Pollution Control Agency - industrial outfalls; Florida Power and Light Co. - heat effluent; State of Florida - heat effluent; Florida Power Corporation - heat effluent; State Board of Control - industrial outfalls; Westinghouse Corporation - desalination plants; Atomic Energy Commission - heat and heat outfalls.

Accomplishments during the past twelve months: 1) Determination of grass community dynamics; 2) Delineation of plant outfall on grass and algal population; 3) Basic information on ecology of major green macroalgae.

For additional information pertaining to this project contact: Richard G. Bader, Director, Sea Grant Program of Miami, Coral Gables, Florida 33146.

SUPPORTED BY U.S. Dept. of Commerce - N.O.

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The specific objectives of this study are: (1) bathymetry of the bay bottom, (2) determination of the bedrock, (3) definition of pollutant sources issuing from the bay and their subsequent distribution, (4) development of a management tool to predict the response of the bay to natural and man-made changes -dredging, filling, hurricanes, etc., (5) determination of optimum channel dimensions, quantity of material to be removed, and optimum location and shape of disposal sites.

The following techniques will be used to accomplish the objectives: (1) bay bottom mapping by negative bathymetry, photography and radar located sonic soundings, (2)

data (velocity, elevation, quality), (5) optimum dredge operation and fill placement determined by using model to test all suggestions.

Fourteen tide gages operating; monthly and quarter QW monitoring programs established; Weather Bureau data being received monthly; bottom contour maps under topographic division review; digital model nearing completion of development period; data reports in preparation; 800 miles of depth data collected along ship channel and other areas.

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Phase III will be concerned with the refinement and testing of models and analytical procedures developed in the previous phases. Tests will be extended to include comparable watersheds. Additional objectives include the determination of the kind, amount, quality, cost, and relative significance of the data needed to make meaningful decisions in an efficient manner. Emphasis will be placed on the development of the techniques and the environment needed to stimulate effective dialogue and collaboration between representatives of the several disciplines involved and between the academic and non-academic participants in the research.

The objective of the proposed research is to analyze critically five watershed models with data from four hydrologically dissimilar Georgia watersheds. Over the past decade, several digital computer programs have been written to model the continuous response of a watershed to precipitation and evapotranspiration. Although each model has been applied to several watersheds, in very few cases have different models been applied to the same watersheds for quantitative comparison of results.

These models are important tools in the design and analysis of land-use and water resources control structures. Better methods for the synthesis of design floods for flood control structures, flood plain management, urban drainage, and highway culvert design are needed. The hydrologic effects of urbanization and the effects of urbanization and the effects of forest and range management practice on the water resource are best quantified through the use of watershed simulation models.

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SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0075, FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA

H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey, Atlanta, Georgia 30309

Previous and continuing studies have defined the flood magnitude-frequency relationship of streams having drainage areas larger than 20 square miles. Practically no reliable information is available for areas smaller than 20 square miles. Economic, safe design of highway drainage structures must, along with other considerations, be based on a knowledge of the magnitude and frequency of floods. This knowledge can only be attained through collection and analysis of factual data from many representative streams chosen on the basis of areal distribution, drainage area size, and a variety of other parameters which may significantly affect peak rates of flow.

The objective of this investigation is to collect the necessary basic data and to analyze those data to develop relationships which may be used to determine flood-frequency characteristics of any small stream in the state.

Streamflow and rainfall data that are collected from 115 strategically located sites will be used to define various components for a digital-computer model of the rainfall-runoff process. Long-term records of flood peaks will be computed by using weather bureau long-term rainfall records as input to the model. Flood-frequency curves will be defined for each data site. Discharge values corresponding to specific recurrence intervals will be taken from these curves and correlated with significant physical and climatic basin characteristics.

Rainfall and discharge data were collected at about 3-week intervals at 110 gage sites. More than 250 flood events were recorded that are considered usable for calibration of the rainfall-runoff model. The long-term Thomasville-Coolidge and Macon storm rainfall and daily rainfall data were coded and placed in computer disk storage. About 60 percent of

# 6.0076, URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII

Y. FOK, Univ. of Hawaii, Water Resources Research Ctr., Honolulu, Hawaii 96822

The problems: The Island of Oahu in the State of Hawaii has experienced a rapid growth in urbanization during the past decade. Therefore, many problems related to urban hydrology have been created such as flood, erosion, sediment deposition and water pollution. Insufficient data available for planning, design and improvement are apparent. Simulations of urban hydrology are most needed.

The objectives: A. Simulation of the urban hydrology for selected urban areas in Oahu. B. Expansion of data collection program to include water quality/sediment, windspeed/sunlight/radiation and soil-moisture in addition to the current rainfall-runoff data collection effort upon the adjoined urban/rural watersheds. C. Establishment of the framework for urban water resources evaluation for subsequent studies.

The procedures: A. To complete the data bank for Kalihi watershed for use in watershed simulation models development. B. To implement the research urban/rural watersheds with water quality/sediment, windspeed/sunlight/radiation and soil-moisture measurement devices to provide a relatively complete data collection program for subsequent urban hydrology and water resources studies. C. To establish a framework for urban water resources systems evaluation.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Res.

# 6.0077, FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII

Y.S. FOK, Univ. of Hawaii, Water Resources Research Ctr., Honolulu, Hawaii 96822 (2R23219961)

The objectives are: (1) to gain greater understanding of the island of Oahu, from available flood data, (2) to investigate the effect of urbanization as reflected in changes of flood hydrographs, (3) to initiate studies for urban and natural watershed models specifically suited for Oahu, Hawaii, and (4) to establish guidelines for subsequent studies of urban water resources systems analysis for Oahu, Hawaii.

This project has been funded for a three-year period study. The first phase was completed and a report was published as Technical Report No. 64, Water Resources Research Center, University of Hawaii, March, 1973.

Document provided to S.S.I.F. by the Highway Research Information Service.

SUPPORTED BY University of Hawaii

# 6.0078, INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS

R. WANG, Univ. of Hawaii, Water Resources Research Ctr., Honolulu, Hawaii 96822

Abstract: An analysis of 200 flood hydrographs of 29 small watersheds on Oahu show some unique hydrologic characteristics. Many of these watersheds are small, some measuring less than 5 square miles, and they have extreme variations in rainfall. Between 4 and 15 single-peak hydrographs were collected for each watershed. The Instantaneous Unit Hydrograph was more adaptable for ocean island conditions such as the Hawaiian Islands, and each individual watershed could be treated by computers. In analyzing these flood

period. A good correlation was found to exist between five rainfall duration and the watershed area.

Pub. Aug. 70: 56p., NTIS No. PB-204 549. \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.

# 6.0079, FLOOD INVESTIGATIONS FOR SMALL WATERSHEDS IN IDAHO

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Boise, Idaho 83702

To provide highway design data based on magnitude and frequency of floods for small drainage basins (less than 100 mi.) in Idaho.

To collect and compile annual peak discharge data for selected sites throughout Idaho. These data will be analyzed by statistical methods to provide flood magnitude and frequency data on which sound hydraulic design and design of culverts and small bridges can be made.

Establish, operate, and maintain crest stage gaging stations with sufficient hydrologic data, statewide, upon which statistical analyses of flood magnitudes and frequencies for small drainage basins can be made.

A 10-year data collection phase ended on Sept. 30, 1969. Data collected to that date has been analyzed for flood magnitude and frequency relations have been established. The relations are to be published in two reports: a design manual for the Idaho Department of Transportation and an administrative report. The second phase of the entire analysis and will be an open-file report.

Complete reports described above and listed below are the result of data collection effort to provide data in areas of flood magnitude and frequency relations are being established. Continue, as required, special studies in river basins and reviews of environmental impact studies.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0080, A METHODOLOGY STUDY TO DEVELOP CRITERIA FOR WILD AND RIVERS - REPORT ON FLOOD CONTROL STUDIES - IDAHO

J.J. PEEBLES, Univ. of Idaho, Water Resources Research Center, Moscow, Idaho 83843

Abstract: The report lists major tributaries to the Snake River and gives monthly and annual records of precipitation and discharge of the Salmon at various points. Apparently, no floods have been caused by rain alone but most are caused by a combination of heavy rain and rain runoff. The history of flooding in the Snake River is recounted and an appendix of 18 maps illustrates areas probably inundated during the Salmon's worst flood occurred in 1894. Costs of past floods are given. Potential flood control storage sites are given along with costs and benefits.

Pub. Feb. 70: 88p., NTIS No. PB-197 997: \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.

# 6.0081, WATER RESOURCES AND FLOOD FORECASTS

AWS/DO is OPR for Volume I, which applies to all AWS units. AWS Forms 39 and 39a are prescribed in this volume.

Pub. Oct. 71: 28p., NTIS No. AD-732 263: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0082, FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS

G.W. CURTIS, U.S. Dept. of the Interior, Geological Survey, Champaign, Illinois 61820

A large percentage of costs for highway drainage structures is for culverts. Efficient culvert design requires information on magnitude and frequencies of floods from areas of less than 10 square miles. Such small areas are not covered by the 1954 report 'Floods in Illinois: Magnitude and Frequency.'

To prepare a report which will complement the 1954 Flood-Frequency Report, and which can be used by those charged with highway culvert design. More specifically, to prepare a report presenting methods of estimating magnitude and frequency of floods occurring on drainage areas less than 10 square miles in Illinois.

Gather data for annual flood events from a State-wide network of about 100 crest-stage gages on drainage areas of less than 10 square miles. Gather supplemental hydrographic parameters at each of these sites with a network of 25 roving recorders. Define selected hydrographic, climatic, and basin parameters for each site. Define frequency levels by Log Pearson Type III Analyses. Run multiple regressions using all significant parameters and provide estimating equations for determination of magnitude and frequency of floods at ungaged sites draining less than 10 square miles.

Annual maximum flood data were determined for the network of small-area stations. Precipitation and hydrographic records were collected for 19 of the stations. Analog precipitation and hydrographic records for 250 storm events for 22 stations were processed for use in calibration of the USGS Rainfall-Runoff Model. Long-term rainfall records for one station were provided by U.S. Weather Service to use with the model to generate long-term annual peak discharges.

Calibrate USGS rainfall-runoff model so that annual peak discharges can be generated on the basis of long-term rainfall records. Continue record collection at present level to provide additional input to the rainfall-runoff model and to extend the period of actual annual peak discharges.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0083, DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA - COMPUTER SIMULATION PROGRAMS

D.H. CHURCHILL, Illinois Inst. for Envir. Qlty, Chicago, Illinois

**Abstract:** Several alternatives have been suggested for solving the waterway flood and pollution problems caused by combined sewer overflows in the Chicago Metropolitan Area. This report describes the evaluation of many of these alternatives with the same computer simulation models of hydrologic and pollution events. The criteria was established that the largest storm period or combination of storm and ground moisture conditions on record should not produce backflow to Lake Michigan when applied to ultimate land and sewer

#### 6.0084, BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS

UNKNOWN, Southwestern Ill. Plan. Comm., Collinsville, Illinois 62234

**Abstract:** The report presents an inventory and description of preliminary findings based upon previously established information related to drainage and flood damage control in Madison, St. Clair, Monroe and Randolph Counties. Preliminary findings include basic information concerning the physical and hydrologic character of the region, and inventory of responsible agencies, and a report on the status of drainage within the major hydrologic units.

Pub. Apr. 73: 102p., NTIS No. PB-222 504/3: PC \$7.25 MF \$1.45.

SUPPORTED BY Illinois State Government - Springfield

#### 6.0085, LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES

B.A. JONES, Univ. of Illinois, Agricultural Experiment Sta., Urbana, Illinois 61801 (ILLU-10-0315)

**Objective:** Investigate performance of soil and water conservation structures by means of hydraulic model studies; study water flow patterns into subsurface drains; and determine causes of failure of certain conservation structures under flood conditions and to study remedial measures for prevention of such failures.

**Approach:** Several model studies of behavior of drop-inlet structures, and energy losses through these structures have been performed; measuring flumes used in the field, calibrated; tile drainage problems including flow patterns, soil movement and filtering materials, studied. Pilot traversing equipment has been and is being used to study velocity distributions in structures under several flow conditions. A tilting model holding table capable of supporting 40 tons is available for tile or watershed studies or flood flow investigations.

**Progress:** A paper reporting the results of the study of water drop size and impact velocity on the detachment of soils was revised and is scheduled for publication in volume 14(1971) of the Transactions of ASAE. An initial study to determine the nature of sediment transport in a 4-inch inside diameter corrugated plastic drain tube was completed. Brown sand was separated into 4 size ranges to test the effect of particle diameter on transport. All other factors were kept constant. The sand was inserted onto the drain tube after equilibrium flow conditions were established and observations taken of the nature of the transport action. The study showed that particles 1 to 2 mm in diameter settled in the bottom half of the corrugations. Smaller sized particles moved along the tube because of the turbulence and were eventually carried out of the tube. In a second study, a sediment metering device was constructed and used to determine a relationship between relative sediment load and slope at incipient deposition. A model study was started to determine the characteristics of flow in a livestock oxidation ditch. In a typical oval shaped oxidation ditch the waste solids settle at 2 locations causing anaerobic conditions to develop in a system that is designed to be aerobic. The objective of this study is to improve the hydraulic conditions in the ditch so that set-

The objective of this project is to evaluate the capabilities and limitations of remote sensing as an operational tool for the assessment and prediction of environmental and ecological impacts of flood control reservoirs. The Sangamon River Basin will be monitored before, during, and after the expected construction of the Oakley Reservoir. Data supplied by remote sensors mounted in aircraft and spacecraft (ERTS I and ERTS II and EREP) will be used.

Sponsor's address: Department of the Army, Construction Engineering Research Laboratory, Interstate Research Park, P.O. Box 4005, Champaign, Illinois 61820.

SUPPORTED BY U.S. Dept. of Defense - Army

**6.0087, DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970**  
*UNKNOWN, Marion Co. Metro. Dev. Dept., Indianapolis, Indiana*

This report is a comprehensive study of watersheds in and entering Marion County. It delineates, describes, measures and classifies each watershed. It inventories and determines the adequacy of all watershed studies previously conducted, and broadly identified needs for future studies. Based upon adequacy of existing studies and needs for future studies, it estimates costs for producing detailed comprehensive drainage and flood control plans for each watershed. The appendix provides detailed stream information. The report includes twelve folded topographic maps in a pocket attached to the rear cover displaying watershed delineation and certain stream information.

Pub. Sept. 70: NTIS on Dept. of Metro. Devel., R. 2041 City-Co. Bldg. Ind., Ind. 46204.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0088, INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL.**

*T.P. CHANG, Purdue University, Water Resources Research Ctr., Lafayette, Indiana 47907*

Abstract: A recently built simulation model for the Upper Wabash reservoir-river system in Indiana was used to study how best to operate that system. The construction of the model and of the three daily operating policies for it (that presently employed by the Corps of Engineers, the Drainage-Area Ratio and the Storage-Volume Ratio) were outlined in two preceding reports. This report discusses results that were obtained with each of the three policies applied to various reservoir configurations having up to five reservoirs, using a variety of runoff input, and for several alternative values of official flood-stage flows. The DAR and SVR policies were both superior to that used by the Corps when the runoff was less than 10 inches. Results obtained for the addition of a small water supply demand at one reservoir indicated that small changes in the mix of project require careful alteration of the operating policies throughout the system. The major conclusion was that this practical model and its operating policies can be a useful aid to design, planning and regulatory agencies.

Pub. Mar. 73: 99p., NTIS No. PB-219 478/S: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0089. PLANT SPECIES AS WILDLIFE COVER AND**

Abstract: This research project was initiated to study the natural establishment of plant species in shoreline areas on recently exposed mudflats following the recession of floodwaters in Iowa's large reservoir systems. The study is suitable species for establishment as wildlife cover for erosion control. The development of vegetatively stable shoreline in Iowa contrasts sharply with the reservoir flood pools. The shoreline of the subimpoundment of the Coralville Reservoir is heavily vegetated. This esthetically pleasant area has no soil erosion and provides manageable natural habitat for wildlife. On the other hand, the impact of floodwater situations in the water level of the Coralville Reservoir is strikingly visible. Dead standing trees, spectating the original forest, dominate the upper reaches of the flood pool landscape. Mud and debris characterize the shoreline immediately following the recession of floodwaters.

Pub. Jul 73: 78p., NTIS No. PB-226 347/3: PC \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0090, STREAMFLOW CHARACTERISTICS OF THE UPPER WABASH R. HEDMAN, U.S. Dept. of the Interior, Geological Survey, Lawrence, Kansas 66044**

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Kansas.

Purpose: To present streamflow data in terms of streamflow useful for the development of optimum benefit from available water supplies and optimum protection from flood.

Methods: Standard statistical and correlative analysis was used to forecast high, low, and base flow at gaging stations on streams. An appraisal of the stream-gaging network was made. Studies of the following are to be included: (1) transmission losses from reservoirs; (2) forecast of likely low flow of streams in the future; (3) river encroachment; (4) regional streamflow; (5) partial duration series of floods; (6) streamflow and basin characteristics; (7) streamflow simulation.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0091, FLOOD INVESTIGATIONS - HIGH FLOOD PROTECTION - KANSAS**

*H.R. HEJL, U.S. Dept. of the Interior, Geological Survey, Lawrence, Kansas 66044*

There is a need to appraise the flood characteristics of streams specifically to permit the most efficient use of Kansas bridges and culverts, but indirectly to permit the determination of magnitude, frequency and influencing factors of floods for all agencies requiring information.

To appraise the flood characteristics of Kansas streams

A crest-stage gage network, supplemented with a stage gage network, is operated to provide basic data of stream stage from small drainage areas. Similar basic data of stream stage are available from the gaging network. Flood-frequency relations are being determined from the data by standard statistical methods. Relations between the information to ungaged sites are being determined by multiple regression analysis using physical and hydrologic characteristics of the basins. Subsequently, characteristics of the basins and of flow from uncontrolled reservoirs and of flow from uncontrolled

model has been successfully applied to three basins as a step toward better definition of relations for small drainages. One major bridge-site report was completed.

The rainfall-runoff model will be applied to as many as possible of the 14 basins for which data appear to be adequate. Bridge-site reports will be prepared on request.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0092, STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV)**

*L.D. JAMES, Univ. of Kentucky, Water Resources Institute, Lexington, Kentucky 40506*

**Abstract:** More informed selection among alternative flood control measures requires better information on marginal differences in flood hazards associated with marginal differences in tributary watershed characteristics. Hydrologic modeling is the most promising approach to answering this question; however, the use of existing models is hampered by the absence of information correlating model parameters with physical characteristics of the watershed. To deal with this situation, a method was developed for estimating the parameter values for the Stanford Watershed Model which best match recorded with simulated streamflows. Physical characteristics were measured for 17 rural watersheds. Correlations between the characteristics and the parameters were examined. Changes in parameter values with urbanization were also examined. The results were used to study variations in downstream flood peaks and in average annual flood damages associated with various tributary watershed characteristics. The end product is designed to help guide urban development to minimize flood damage and storm drainage cost.

Pub. 1970: 127p., NTIS No. PB-198 444: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0093, FLOOD-FREQUENCY STUDY - KENTUCKY**

*C.H. HANNUM, U.S. Dept. of the Interior, Geological Survey, Louisville, Kentucky 40202*

A statewide flood magnitude and frequency report was prepared and published in 1962, but the cut-off date for computations was the 1957 water year. The nation-wide flood frequency studies had a 1959 water year cut-off for part 3b and a 1960 water year cut-off for part 3a. The Kentucky Department of Highways has requested that the studies be updated as soon as possible. The Highway Department and their consulting engineers are the largest users of this information.

To develop procedures and techniques for estimating probable frequency of flooding on streams, gaged or ungaged, throughout the state. Update the previous report to include records at gaging stations through the 1969 water year. Data analyses to be made using the regression method rather than the index flood method.

A comparison of the Log-Pearson Type III plots with the flood-index method plots indicates the former is appropriate when outliers are removed from the sample of peak discharges. The flood-index method was used to define the

Multiple-regression analysis will be made of floods for designated recurrence intervals with basin parameters. Results will be regionalized and report prepared during next fiscal year.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0094, FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA**

*UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Baton Rouge, Louisiana 70803*

Definition of the magnitude and frequency of floods in streams with drainage areas of less than 10 square miles are required for hydraulic design of highway culverts.

Determine the effect of basin parameters in different physiographic settings so that methods may be established to calculate frequency of peak discharges from ungaged drainage areas of less than 10 square miles.

Stage-rainfall recording stations and crest-stage gages on selected culverts will be established on about 75 drainage areas. Drainage area parameters will be determined and final analysis made after about 10 years of data collection so that long-term runoff can be simulated.

Data collection was continued at the gages now in operation. Work was continued on culvert ratings. Emphasis was placed on processing records collected at the 50 dual-digital gages.

Data collection and data processing will be continued; computation of culvert ratings will be completed. Work will be continued for the purpose of making a preliminary analysis and providing preliminary methods of computing flood-frequency relations for small streams.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0095, HYDROLOGIC STUDIES (STORM STUDIES)**

*B.J. GARRETT, U.S. Army, Engineering Division, New Orleans, Louisiana 70160*

There are 8 Part I and 12 Part II studies to be completed. Results of Storm Studies are summarized and published by office of the Chief of Engineers as 'Storm Rainfall of the United States,' and distributed to U. S. Army Engineer Divisions and Districts for pertinency to basic design criteria for flood control and other projects.

SUPPORTED BY U.S. Dept. of Defense - Army

**6.0096, GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV)**

*UNKNOWN, U.S. Army, Engineer District, New Orleans, Louisiana 70160*

**Abstract:** The report describes the administrative proposal for construction of about 43 miles of exterior levees together with associated borrow pits, drainage structures, and other appurtenances to provide protection from hurricane floods along both banks of Bayou Lafourche from Larose to a point 2 miles south of Golden Meadow, Louisiana. This project is located entirely in Lafourche Parish, Louisiana. Environmental impacts are discussed.

Pub. Sep. 72: 39p., NTIS No. EIS-LA-72-5427-D: PC \$4.00.

SUPPORTED BY U.S. Dept. of Defense - Army



6.0098,

proximately 36 miles) on the west bank of the Mississippi River, including a new floodgate at Empire and construction of a new levee from Phoenix to Bohemia (approximately 16 miles) on the east bank. In addition, a barrier levee from Bohemia to 10 miles above the Head of Passes to protect the west bank of Plaquemines Parish from hurricane flooding will be built. Drainage capability and roadway access will be maintained within the project area. Environmental impacts are discussed.

Pub. Aug. 72: 34p., NTIS No. EIS-LA-72-5425-D: PC \$3.75.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0098, LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT

UNKNOWN, U.S. Army, Engineer District, New Orleans, Louisiana 70160

Abstract: The project is concerned with construction of barriers, levees, and hurricane protective works in Jefferson and Saint Charles Parishes, Louisiana for the purpose of flood control and protection of lives and property. Effects expected due to construction include destruction of marshes and loss of wildlife habitat.

Pub. Apr. 72: 96p., NTIS No. EIS-LA-72-5174-D: PC \$7.00.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0099, MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA)

UNKNOWN, U.S. Army, Engineer District, New Orleans, Louisiana 70160

Abstract: The statement proposes a project which provides for the enlargement of 21.4 miles of existing levee and construction of 3.5 miles of new levee in the vicinity of Franklin, Louisiana, to minimize flooding from a severe hurricane. Numerous pipeline crossings will be relocated, existing pumping stations will be modified, and drainage structures will be modified or replaced to meet increased levee grades. The project will effect a complete closure of the area to be protected. The project is located in St. Mary Parish, Louisiana. Significant environmental impacts in the project area are not anticipated. Other than additional borrow areas, the project will alter the existing terrain only to the extent of raising and strengthening the existing Federal levees, and the construction of 3.5 miles of new levee. The human environment will be enhanced by protection of life and property during hurricane flooding.

Pub. Jan. 73: 66p., NTIS No. EIS-LA-73-0989-F: PC \$5.50 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0100, RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS

UNKNOWN, U.S. Army, Engineer District, New Orleans, Louisiana 70160

Abstract: The project is concerned with emergency measures at 16 locations along Red River between the Mississippi River and the vicinity of Index, Arkansas for the purpose of flood control and river bank protection. Effects expected due to construction are expected to be beneficial. Unavoidable permanent adverse effects would be reduction of land area and shortening of Red River.

Pub. Jun. 72: 144p., NTIS No. EIS-LA-72-5162-D: PC \$9.00

R.W. RAFUSE, Mathematica Incorporated, Bethesda, Maryland 20014

Abstract: The research, based on accepted theory of finance and grounded in welfare economics, presents important findings in a number of controversial areas. It is concluded that the net fiscal benefits of flood control projects, but somewhat less apparent from an analysis of economic efficiency benefits and costs from a national perspective. Second, its value in assessing the effectiveness of investment from the federal government's perspective is negligible, since a portion of the gains are returned as tax revenues for all private citizens. Federal expenditures.

Pub. Sep. 71: 131p., NTIS No. AD-734 834: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0102, FLOODS FROM SMALL DRAINAGE AREAS, MARYLAND

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, College Park, Maryland 20740

Large expenditures of funds for new highway construction for improvement of existing highways have focused the attention of highway engineers on the need for hydrologic data on small drainage areas. This project is designed to supplement existing network of stream gaging stations with the collection and recording of runoff and rainfall data from drainage areas less than 100 square miles.

Rainfall and runoff data from small drainage basins (less than 100 square miles) will be collected and analyzed by a new method to predict flood magnitudes and recurrence intervals. The development of accurate flood design procedures in the past has been hampered by a scarcity of flood data from small drainage areas. The results of this study are particularly useful in establishing improved criteria for flood control structures.

About 40 crest-stage gages with flood hydrograph recorders are being operated and flood discharge measurements are being made at miscellaneous sites. These data are analyzed to determine flood frequency relations of lag times and other basin characteristics. Flood runoff data will be evaluated in connection with developing the method for predicting flood recurrence intervals.

Maintenance and servicing of all gages was completed. Digital rainfall recorders and 3 digital stage recorders are installed at various gage sites. Indirect measurements of peaks from tropical storm Agnes were computed at gage sites. Long term rainfall data from two non-service rain gages were analyzed and processed into unit rainfall data at five-minute intervals. Significant progress has been made on preparation of maps covering the floods of August and September 1963. A report now is considered about 70 percent complete.

Regular servicing and data processing operations are continued. Another basic data compilation is in progress.

**Abstract:** The river and flood forecast and warning service of the National Weather Service depends on meteorological data and a vast hydrologic reporting network of nearly 5000 river and rainfall stations. Reports are collected daily or on a criteria basis during periods of heavy rainfall and/or high flow in the rivers. In 1967-1969, an experiment in river and rainfall data collection via NASA's ATS-1 satellite was conducted. The technical and operational feasibility of data collection from remote sites via satellite was proved in the test. NASA will launch for NOAA in 1973 the first in a planned series of geostationary operational environmental satellites (GOES). In conjunction with this, a prototype network is scheduled for installation in the Columbia Basin of the Pacific northwest. This system could form the basis for a national data collection system to serve the nation's water resources users. During the next decade, it is anticipated that the hydrologic data collection network will double in order to satisfy river and flood forecast service needs placed upon the National Weather Service.

Pub. Sep. 71: 6p., NTIS No. COM-72-10564: Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0104, HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM

**W. STAATS**, U.S. Dept. of Commerce, Equipment Development Lab., Silver Spring, Maryland 20910

**Technical objective:** Improve equipment used for measuring hydrologic parameters as requested by the NWS Office of Hydrology.

**Approach:** Redesign the Flash Flood Alarm System to provide for battery and radio operation. Develop, test, and evaluate electronic telemetering devices for interfacing the tipping bucket, Universal, and Fisher & Porter precipitation gages to the data acquisition remote control (DARC) telemetry system. Collect data on various evaporation measuring devices to assist energy transfer studies being performed by the NWS Office of Hydrology.

**Progress:** Development work on a modified Flash Flood Alarm System which will permit low power battery operation of the remote components has been completed, and T&E of this radio version of the alarm is underway. Test and evaluation is virtually completed on prototype digitizers for tipping bucket and universal precipitation gages. Energy budget measurements have been made at the Sterling Research and Development Center test site throughout the year. An experiment in heating the water in an X-3 evaporation pan to allow energy budget readings to be made through the winter has been generally successful.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0105, FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN

**P. AKLILU**, Univ. of Massachusetts, Water Resources Research Ctr., Amherst, Massachusetts 01002

**Abstract:** Results are presented of the economic potential of flood proofing measures for reducing flood damages. The empirical application focuses on several communities in the Connecticut River Basin. A literature review of flood proofing measures and a treatment of decision-making under uncertainty are included. A partial equilibrium framework (model) for making flood proofing choices for various types

of communities, and some remarks are made concerning the incidence of benefits and costs of such flood damage reduction measures.

Pub. Aug. 73: 109p., NTIS No. PB-228 133/5: PC \$8.50 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0106, FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS

**C.G. JOHNSON**, U.S. Dept. of the Interior, Geological Survey, Boston, Massachusetts 02203

To obtain an adequate measure of streamflow characteristics of small drainage areas, and to analyze the streamflow records for particular needs of the highway engineer.

The development of a technique for estimating the magnitude and frequency of floods on small drainage areas in Massachusetts for the use of the highway engineer.

Installation and maintenance of 10 continuous-recording stream gages with recording rain gages plus about 40 crest-stage gages on drainage basins of less than 10 square miles, all located in carefully selected places so as to sample a wide range of physiographic variables, and probably using a multiple-regression analysis.

Discharge data has been collected at 5 continuous-recording streamflow stations plus recording rainfall records in addition to annual peaks at the 15 crest-stage gages. A status report has been started.

Continuation of data collection.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0107, DESIGN OF OPTIMAL PRECIPITATION NETWORKS

**W.M. GRAYMAN**, Mass. Inst. of Technology, School of Engineering, Cambridge, Massachusetts 02139

**Abstract:** The design of a precipitation measuring network based on the cost of the network and the benefits derived from the measurements is demonstrated. A single objective, maximize net national income and a single purpose use of the measurements in a flood warning system form the basis for the analysis. Two models are developed to determine the net benefits resulting from a particular network design. One model is a simulation model in which a trace of floods is generated, the error in flood prediction as a result of precipitation measurements is simulated and the net benefits are calculated. A second model is based on the convolution of probability distributions to determine the expected value of net benefits. A case study is performed in which the expected value model is used to determine the optimal precipitation measuring system for a river basin based on data representing the West Branch of the Susquehanna River. This study indicates the importance of considering network accuracy in the design of the network and in determination of the feasibility of a flood warning system.

Pub. Mar. 73: 126p., NTIS No. PB-227 221/9: PC \$5.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0108, HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT

**UNKNOWN**, U.S. Army, New England Division, Waltham, Massachusetts

temporary or short-term effects to the biological makeup of the area may occur when the control gates are closed during periods of tidal flooding

Pub. Dec. 71. 36p., NTIS No. PB-204 571-D PC \$3.00.

SUPPORTED BY U.S. Dept. of Defense - Army

**6.0109, OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS**  
*UNKNOWN, U.S. Army, New England Division, Waltham, Massachusetts*

**Abstract:** The project proposes operation and maintenance of the main harbor barrier and dike and its related structures. Environmental impacts include protection to the highly developed commercial, industrial and residential areas from tidal flooding during major coastal storms and hurricanes, serves a protective facility for harbor-based and transient vessels; compressed air jetting which causes some temporary turbidity, rodent control. Rodent control and air jetting could be considered to have possible adverse effects.

Pub. Aug. 73. 37p., NTIS No. EIS-MA-73-1353-F: PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

**6.0110, OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS**

*UNKNOWN, U.S. Army, New England Division, Waltham, Massachusetts*

**Abstract:** The New Bedford Barrier is located on the northwesterly side of Buzzards Bay, 50 miles southerly of Boston, Massachusetts. It extends for a total distance of approximately 3 1/2 miles across the southerly portion of the City of New Bedford and the Town of Fairhaven. The statement concerns the operation and maintenance of the main Harbor Barrier and Dike and its related structures.

Pub. Jun. 72. 31p., NTIS No. EIS-MA-72-4782-D: PC \$3.75.

SUPPORTED BY U.S. Dept. of Defense - Army

**6.0111, NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT**

*UNKNOWN, U.S. Army, New England Division, Waltham, Massachusetts*

**Abstract:** Construction is proposed of a 5,900 ft. system of earth filled rock protected barriers, with navigation openings, for protection of the City of New London, Connecticut, from hurricane flooding. The impact would be favorable, replacing a blighted area facing a valuable waterfront with an area where manufacturing, open space, parks, walkways, and shorefishing facilities could be developed. Views would be restricted, and a temporary adverse effect on marine life during construction would result.

Pub. Jul. 71. 21p., NTIS No. PB-201 310-F: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**6.0112, RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS**

*E.F. BRATER, Univ. of Michigan, School of Engineering, Ann Arbor, Michigan 48106 (72P00617)*

Objectives of the project are to gain a better understanding of the factors which control the relationships between storm rainfall, or snowmelt, and the resulting storm runoff, and to

and would provide information for the operation of facilities for control of pollution of water and or combined sewage

SUPPORTED BY U.S. Environ. Protect. Agency -

**6.0113, FORECASTING RAINFALL AND SNOWMELT AND FLOODS ON UPPER MIDWESTERN WATERSHEDS**

*C.E. BOWERS, Univ. of Minnesota, St. Anthony Lab., Minneapolis, Minnesota 55414*

The objective of this study is the development of procedures and the correlation of hydrologic data for the prediction and control of spring floods in the Upper Midwest watersheds. The study is divided into three phases. The first phase, presently under way, involves the collection of meteorologic and hydrologic data concerning floods and new data pertaining to floods during the spring period. Under Phases II and III the data will be used in using available mathematical models, modifying existing models, and new models to assist in synthesizing flood runoff records, particularly for the spring season.

The Upper Midwest is a relatively flat area compared to the mountainous regions of the country; a study of the relation of snowmelt to spring floods and the critical conditions of hydrologic conditions that are characteristic of floods in this area is urgently needed. Of special interest is the water content of snow over large watersheds. The study with data concerning late winter and early spring precipitation, air temperature, soil temperature, soil moisture, wind, antecedent conditions, and watershed characteristics.

SUPPORTED BY U.S. Dept. of Interior - O. W. R. -

**6.0114, BRIDGE SITE INVESTIGATIONS**

*C.H. TATE, U.S. Dept. of the Interior, Geological Survey, Jackson, Mississippi 39205*

The Mississippi State Highway Department annually spends about \$5 million in bridge construction. Streamflow hydrologic analyses of the basin, and hydraulic analyses of the proposed crossing are necessary in proper planning of these bridges.

To prepare 20 to 50 administrative bridge-site reports as requested by the Mississippi State Highway Department.

At a typical crossing, the report is based on: (1) historical elevations recovered by the U.S. Geological Survey; (2) discharges for these historical floods determined from gauged sites; (3) flood-frequency characteristics of the basin; (4) hydraulic characteristics of the crossing.

Reports including both hydrologic and hydraulic information were prepared for approximately 45 sites.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0115, SPECIAL FLOOD REPORTS - MISSISSIPPI**

*C.H. TATE, U.S. Dept. of the Interior, Geological Survey, Jackson, Mississippi 39205*

Floods are the greatest surface-water problem in Mississippi. The record of the magnitude of these floods and a study of the history of previous floods are of value in designing flood control structures such as bridges, levees, dams and floodgates, and in planning the efficient utilization of water resources of the region.

To prepare an annual report compiling one or more of the exceptional magnitude which occur each year

usually relatively small areas.

To describe these flood events, it often is necessary to supplement recorded information by interviewing local residents regarding flood elevations and rainfall. It is also necessary to supplement gaging station data with computed flood discharges based on highwater marks left during the flood.

Two indirect measurements were obtained from small drainage areas for the flood of July 30, 1971, on Gallagher Creek in Meridian. The report 'Gallagher Creek Flood of July 30, 1971,' was prepared for open-file release in October 1971. The report 'Floods in Mississippi, October 1967 Through September 1969' was rewritten and near publication at the end of the 1972 fiscal year. Data was collected and compiled for the flood of December 6-7, 1971, in southwestern Mississippi. The report 'Floods in Mississippi, October 1969 Through September 1971' was written and in review status at the end of the 1972 fiscal year.

To collect special flood data as needed to supplement gaged data and to compile and report flood events through the 1972 water year.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0116, DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION

C.E. CHATHAM, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: A 1:75-scale model of the lower 2000 ft of the Chagrin River and sufficient offshore area in Lake Erie to permit generation of the required test waves was used to investigate the arrangement and design of certain proposed improvements with respect to wave action and flood control. The proposed improvement plans consisted of (a) arrowhead breakwaters in Lake Erie at the mouth of the river, aggregating about 2360 ft in length; (b) realignment and enlargement of the river channel from Lake Erie through the city of Eastlake, with levees where required to supplement channel enlargement; (c) a spur channel and an access channel for navigation; (d) recreational facilities at the river mouth; and (e) the addition of beach fill and protective groins along the shoreline east of the east breakwater. A 60-ft-long wave machine and electrical wave-height measuring and recording apparatus were utilized in model operation.

Pub. Sep. 70: 92p., NTIS No. AD-756 118: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0117, DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION

G.A. PICKERING, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: The discharge characteristics of the navigation opening (base width of 1500 ft) in the proposed hurricane barrier for the East Passage of Narragansett Bay, Rhode Island, were investigated by means of both section and three-dimensional models. Two section models, reproducing the barrier at scales of 1:50 and 1:150, were used to determine the effect of approach depth, roughness of the barrier, and weir design on the discharge characteristics of the structure. A 1:150-scale, undistorted, three-dimensional model was used to determine the discharge characteristics of two weir plans for

discharge equations applicable to both steady state flood and ebb flows were developed.

Pub. Apr. 65: 38p., NTIS No. AD-733 847: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0118, ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION

G.A. PICKERING, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: The Ansonia-Derby project will provide protection for the cities of Ansonia and Derby, Conn., from flooding of the Naugatuck and Housatonic Rivers. The proposed plan for containing the river flows requires about 13,300 ft of earth dikes and 6850 ft of floodwalls, extending about 2-1/2 miles along the Naugatuck River and 2000 ft along the Housatonic River. A 1:120-scale model was used in the investigation and reproduced approximately 4000 ft of the Housatonic River and 16,000 ft of the Naugatuck River. Tests were concerned with flow conditions at bridges and channel transitions, water-surface elevations for selection of grades for the dikes and floodwalls, and velocities for use in the design of riprap to be placed on the river side of the dikes and in portions of the channel. Flow conditions were poor and water surfaces were higher than expected in the upper reach of the project; however, a satisfactory design was developed for this area. Water-surface profiles and bottom velocities were obtained with the final design for both the design discharge and the capacity flow.

Pub. Apr. 69: 46p., NTIS No. AD-723 969: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0119, PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES

H.B. SIMMONS, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: The design of barriers for protection of Narragansett Bay against inundation by hurricane surges required use of a comprehensive model to determine the effects of proposed structures on normal tide and hurricane surge heights, current velocities, the salinity regimen of the bay, and the rates of diffusion and flushing of pollutants discharged into the bay. Model tests indicated that barriers should not be located in the central portions of the bay because of excessive build-up of surge heights downstream from such barriers, that a lower bay barrier alone could not satisfy the requirements of the Navy and at the same time afford the desired reductions in surge heights at upstream locations, but that the combination of a gated structure at Fox Point for the protection of Providence with a system of lower bay barriers with ungated openings could satisfy the requirements of the Navy for maximum current velocities and at the same time provide hurricane surge protection throughout the bay system.

Pub. Oct. 64: 122p., NTIS No. AD-718 220: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0120, FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS

UNKNOWN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

6.0121.

Adams, Massachusetts, were conducted to supplement and verify hydraulic computations for the initial design or to develop alterations effecting greater hydraulic efficiency or reduction in construction costs. A 1:30-scale model was used to check such design features as chute alignment, superelevation in bends, hydraulic performance of stilling basin, weir, and transitions, requirements for intakes and outlets, wall heights, and elevations of bridges.

Pub. Jun. 62. 156p., NTIS No. AD-757 403: PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0121, FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER VALLEY

UNKNOWN, U.S. Army, Lower Miss. Valley Div., Vicksburg, Mississippi 39180

The report describes the major flood control works in the lower Mississippi Valley and improvements on the principal tributary basins of St. Francis, Cache, West Tennessee, Yazoo, Boeuf-Tensas and Red River. Maps and hydrological data are also included.

Pub. Mar. 73: 39p., No copy info. available.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0122, SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI

T.E. HARBAUGH, Univ. of Missouri, Water Resources Research Ctr., Columbia, Missouri 65201

Abstract: At present 1970, over 1500 small dams exist within the boundaries of the State of Missouri. Estimates indicate the number is growing at the rate of one hundred to two hundred per year. The main factor in possible failure of these existing dams is an inadequate spillway resulting from poor hydraulic practice and/or lack of accurate hydrologic design information. The report presents the result of a state wide analysis of all existing hydrologic data for rural watersheds less than twenty square miles. The results are presented in nomograph form for the 25 and 50 year frequency floods. The report also contains equations for other frequencies at two accuracy levels. The results of this investigation should provide designers of spillways, culverts and bridges with the latest hydrologic flood frequency data for small rural Missouri watersheds.

Pub. Jun. 70: 28p., NTIS No. PB-195 284: HC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0123, OPTIMIZATION OF OPERATION OF A SYSTEM OF FLOOD CONTROL RESERVOIRS

A.T. HJELMFELT, Univ. of Missouri, School of Engineering, Columbia, Missouri 65201

Abstract: Probabilistic methods of hydrology and optimization techniques were used to determine an optimal sequence of releases from a system of reservoirs during a flood emergency. The operation schedule for a reservoir was determined from estimated inflow to the reservoir, current reservoir contents and downstream conditions. Linear programming was used to establish the optimal operating procedure. The dura-

Pub. Jul. 73: 133p., NTIS No. PB-228 606/0: \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.

#### 6.0124, FLOOD WAVES FROM A BREACHED DAM

T.E. HARBAUGH, Univ. of Missouri, Water Resources Research Ctr., Rolla, Missouri 65401

Abstract: A conceptual method to alleviate flood to overtopping failures of small earthfill dam. Incorporation of a relatively thin erosion retarding layer in the dam. This paper investigates the reduction in release due to the hypothetical erosion retarder. The paper also provides a method for the determination of the optimal location of the layer so as to minimize possible reservoir release due to a gradually breaching dam. The transient reservoir flow is simulated by a model, based upon the solution of the one-dimensional unsteady open-channel flow equations. The equations are solved by the method of characteristics. Appropriate boundary conditions are incorporated in the procedure. The numerical simulation model is used to determine the reduction in reservoir release due to the erosion retarding layer and its optimal location for a wide variety of dam geometric, hydraulic and dynamic parameters. The sensitivity of the results to variations in the above parameters is discussed.

Pub. Aug. 71: 71p., NTIS No. PB-204 493: \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.

#### 6.0125, APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION FOR MONTANA - VOLUME 1 - REPORT

E.R. DODGE, Montana State University, School of Engineering, Bozeman, Montana 59715

Abstract: A regional frequency analysis was performed using both natural and synthetic streamflow records to estimate flood magnitude of various recurrence intervals for each of 230 Montana Watersheds. Using regional flood peak prediction equations for the 2, 5, 10, 25, 50, 100, and 200 year recurrence intervals were developed for continuous geographic regions in Montana. These estimates of the flood peak as the product of power-law hydrologic watershed parameters. A detailed analysis of the hydraulic conditions which occur for various culvert flow is presented along with modern methods for culvert selection.

Pub. Sep. 72: 136p., NTIS No. PB-220 093/0: \$0.95.

SUPPORTED BY Montana State University - 1

#### 6.0126, DEVELOPMENT OF AN OPERATIONAL SCHEDULE FOR MONTANA'S WATER RESOURCES - CREEK RESERVOIR OPERATION

T.T. WILLIAMS, Montana State University, Water Resources Research Ctr., Bozeman, Montana 59715

Abstract: Operational problems at Hyalite Reservoir were investigated in a one-year pilot study. Hydrologic purpose (irrigation) reservoir which is

delayed so as to insure storage availability at the time of runoff peak. Linear programming and dynamic programming procedures were presented to demonstrate the feasibility of optimizing reservoir releases over a four-season period. As applied to Hyalite Reservoir, the techniques are of limited use, because spring inflows are almost always adequate to completely fill the reservoir. The techniques will be valuable when applied to a larger basin such as the Musselshell, which is under further investigation.

Pub. Sep. 73: 57p., NTIS No. PB-226 119/6: PC \$3.50 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0127, PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, N.J.

*ET. KILLAM*, Union County Planning Board, *Elizabeth, New Jersey*

This report represents the second stage of the Preliminary Storm Drainage and Flood Control Plan. Specially, it provides an analysis of tidal influence upon storm drainage within the county, as well as comprehensive stream improvement programs for each of the county's watersheds. Included also with the recommended improvement plans are cost estimates for the proposed improvements and recommended program staging and implementation procedures.

Pub. May 71: NTIS on Union County Planning Board Courthouse, Elizabeth, N.J., H.U.D. Regional Office Library, Region, New York, New York.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0128, FACTORS PERTINENT TO WATER QUALITY IN THE ALBUQUERQUE METROPOLITAN AREA

*UNKNOWN*, Albuquerque Urban Observatory, *Albuquerque, New Mexico*

Abstract: The focus of the report is on the problems associated with the Albuquerque metropolitan area's water supply and waste water, and additional problems, such as flood control, as they relate to these two primary areas of focus. The report contains a detailed tabulation of pertinent legislative authority; a description of some actual administrative procedures; a review of geological and geographic factors; a summarization of current master plans; a description of equipment, personnel, and personnel training; and a listing of funding and advisory sources.

Pub. Nov. 70: 87p., NTIS No. PB-208 122: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0129, INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO

*A.G. SCOTT*, U.S. Dept. of the Interior, Geological Survey, *Santa Fe, New Mexico*

The State Highway Department needs flood-frequency, and magnitude of floods, to better design highway drainage structure.

To obtain and analyze hydrologic data which can be used in the design of highway drainage structures. More specifically, to determine the flood frequency and frequency of floods

150 crest-stage gages. Small basins in diverse areas will be selected to insure a wide sampling of the various basin parameters. The relations between rainfall and runoff will be defined. This relation will produce a record of synthetic floods. The measured and synthetic floods will define a frequency curve representative of the site. The frequency characteristics will then be related to basin characteristics by regression analysis. The resulting relation should produce reliable estimates of flood-frequency characteristics on small basins throughout the state.

Collection of discharge, peak flow, and precipitation data continued. All data were updated, coded, and submitted for storage on computer. A long record of annual peaks for one flood-hydrograph station was synthesized by utilizing the USGS Rainfall-Runoff Model. Work was completed on the evaluation of the data collection phase of the project and the report submitted for review.

Continue data collection and tabulation.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0130, REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK

*J.A. FINCK*, State Dept. of Env. Conserv., *Albany, New York* 12205

The project is composed of a number of individual regional water resources planning studies, each of which includes an inventory of the area's water resources, both quantity and quality, an assessment of present water resources management needs and opportunities, as well as projections of future needs. Categories of water use included are water supply, water quality, irrigation, recreation, fish and wildlife, power, navigation and flood control. Projections of needs and opportunities are derived from an economic base study and the recommended management plan is selected from sets of alternative measures.

Basic data on hydrology, economics and water utilization are obtained from review of existing information as well as collection using field observation interviews and mail questionnaires.

Each river basin study is under the auspices of one or more regional planning boards. At present, studies are underway or completed in eleven board areas. The Erie-Niagara Basin study has been completed. The Oswego River Basin is being cooperatively studied by three regional boards, the Susquehanna by two and the Delaware, Black, St. Lawrence, Genesee and Allegheny Basins each by one board. These latter studies are scheduled for completion generally in 1974.

A regional board is composed of seven local residents of the area to be studied and is appointed by the Department of Environmental Conservation. The boards are responsible for the conduct of the study including the development of the comprehensive plan for the management of their region's water resources.

SUPPORTED BY New York State Government - Albany

#### 6.0131, USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM

*C.S. LIU*, State Dept. of Env. Conserv., *Albany, New York* 12205

6.0132.

linear programming technique used generated a flood control utility measuring function to the monthly operations model which indicated the available storage for conservation purposes.

Pub. Jul. 71: 70p., NTIS No. PB-205 281: PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0132. AN EVALUATION OF URBAN FLOOD PLAINS**

J.E. GODDARD, Amer. Soc. of Civil Engrs., New York, New York 10017

**Abstract:** Using 26 'Urban Areas' with populations ranging between 50-thousand and 7-million persons as a national sample, close to one-sixth of urban lands in the U.S. lie within natural 100-year flood plains, and slightly over one-half of such flood plains already have been developed. Average annual flood damages for urban areas may be about three-fifths of the national total. Slightly over half of the national investment in flood control works have been for the protection of urban areas. Information available does not permit estimation of implied benefits. In comparison, well over one-half of urban lands are served by systems of underground drainage that represent over four times the capital investment in flood plain protection and are associated with approximately the same level of average annual flood damages. Much of the flood-plain flooding problem as well as the land-runoff water quality problem could possibly be more effectively countered on the land feeding urban watercourses, provided planning and development of drainage systems and flood plain management programs can be coordinated and integrated. Specific recommendations are made on acquisition of needed information. There are implications for emerging national water policies.

Pub. Dec. 73: 48p., NTIS No. PB-227 337/3: PC \$3.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0133. WATER RELATED ENVIRONMENTAL SERVICES**

UNKNOWN, Central New York Reg. Pln. Bd., Syracuse, New York

**Abstract:** The report summarizes the analysis phase of water supply, sewage disposal, storm drainage, and flood control in the Central New York Region. Present and expected problems of service quality and quantity have been examined along with potential measures to alleviate these problems and upgrade service. Interservice and service-to-environment relationships, involving such factors as environmental quality, benefit-cost considerations, economics of scale, and intertie arrangements, were noted throughout the analysis. The analysis included an examination of the various possible solutions to each locale's needs; some of the more involved alternatives are dealt with in detail.

Pub. Nov. 70: 149p., NTIS No. PB-198 086: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0134. EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA**

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey, Raleigh, North Carolina 27607

encroachment, many areas which were formerly mapped are now flooded with increasing frequency.

Hydrologic data before and after urban development is usually unavailable. Therefore, rainfall-runoff data for watersheds that are in the same region but in different stages of urbanization will be used for analysis and comparison. 1. Evaluate quantitatively the flood potential of watersheds smaller than 5 square miles. 2. Derive relationships for determining peak discharge from small watersheds by evaluating the effects and relationships between natural and urban characteristics.

Continuous rainfall and runoff data will be recorded at selected sites. The recorded data will be used in conjunction with long-term rainfall to generate long-term runoff data. The generated data and short-term data along with observed long-term data for the region will be used in several linear regression analyses to determine the relationship to basin characteristics. Which physical factors and changes can be evaluated? Significant factors will be combined in formulas for peak discharge having selected recurrence intervals.

Analysis of the data for this project has been completed. Preparation of the final report has been started. The investigators have used a family of curves, each depicting a different degree of urban development, to relate basin characteristics to the stream length divided by the square root of slope ( $L/\text{square root of } S$ ). For this project the relationship between area of impervious cover to the total drainage area is included in the analysis to define the basin lag time. As a result, only one curve is required to depict a family of urban development. The report was substantially completed at the end of the year.

Complete and publish report of project results. The use of recurring records will continue under project N0011-0011 surface water stations.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0135. EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA**

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey, Raleigh, North Carolina 27607

The City of Durham (as most cities) is faced with problems of drainage and damage resulting from flooding of streams. Drainage problems include design of small culverts, storm sewers, and stream-channel modifications. Because of urban developments in the basin and encroachment, many areas which were formerly mapped are now flooded with increasing frequency.

Hydrologic data before and after urban development is usually unavailable. Therefore, rainfall-runoff data for watersheds that are in the same region but in different stages of urbanization will be used for analysis and comparison. (1) Evaluate quantitatively the flood potential of watersheds smaller than 5 square miles. (2) Derive relationships for determining peak discharge from small urban watersheds by evaluating the effects and relationships between various natural and urban characteristics.

Continuous rainfall and runoff data will be recorded at selected sites. The recorded data will be used in conjunction with long-term rainfall data. The generated short-term data along with observed long-term data for the region will be used in several linear regression analyses to determine the relationship to basin characteristics. Which physical factors and changes can be evaluated? Significant factors will be combined in formulas for peak discharge having selected recurrence intervals.

Data collection and analyses were completed during the previous year. A report on this and other urbanization projects, as described under reports for project No. NC 62-030C, Charlotte, will be forthcoming.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0136, EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA

A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey, Raleigh, North Carolina 27607

The City of Lenoir (as most cities) is faced with problems of drainage and damage resulting from flooding of small streams. Drainage problems include design of small bridges, culverts, storm sewers, and stream-channel treatment. Because of urban developments in the basin and flood-plain encroachment, many areas which were formerly rarely inundated are now flooded with increasing frequency.

Hydrologic data before and after urban development are usually unavailable. Therefore, rainfall-runoff data from watersheds that are in the same region but in different stages of urbanization will be used for analysis and comparison to: (1) Evaluate quantitatively the flood potential of urban watersheds smaller than 5 square miles. (2) Derive usable relationships for determining peak discharge from small urban watersheds by evaluating the effects and relation of various natural and urban characteristics.

Continuous rainfall and runoff data will be recorded concurrently at selected sites. The recorded data will be used in conjunction with long-term rainfall data to generate expected long-term runoff data. The generated and observed short-term data along with observed long-term data in the region will be used in several linear regression models for determination of relationships to basin characteristics for which physical factors and changes can be evaluated. Significant factors will be combined in formulas for peak discharge having selected recurrence intervals.

Data collection and analyses were completed during the previous year. A report on this and other urbanization projects, as described under reports for project No. NC 62-030C, Charlotte, will be forthcoming.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0137, USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA

C.W. WELBY, Univ. of North Carolina, School of Agriculture, Raleigh, North Carolina 27607

The basic objective of this investigation is determination of the extent to which multispectral photography is useful in North Carolina water resource planning and management. A four lens multispectral camera will be flown over various test sites to evaluate its use in water pollution monitoring, in studying of flooding along streams, and in evaluation of sediment distribution in lakes and estuaries. Attention is to be given to the cost-effectiveness of the method.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0138, MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA

G.A. GROENK, U.S. Dept. of the Interior, Geological Survey,

could result in improved methods of computing probable flood flows from small areas.

To provide a method of evaluating the effect of basin characteristics on the magnitude of flood flows.

Three separate areas across the state with adjoining basins of different shape are heavily instrumented for rainfall and runoff data. This data will be collected for various rainstorms and evaluated for effects on flood magnitude.

During the first quarter of the 1973 water year records of all rainstorms and streamflow were obtained. Field data collection terminated as of October 1972. Collection of basin parameters was completed. Analysis of the data is in process.

A completed report is planned for early in the 1974 fiscal year. The data are being analyzed through regression equations.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0139, STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA

V.B. SAUER, U.S. Dept. of the Interior, Geological Survey, Oklahoma City, Oklahoma 73102

The safe and economic design of highway bridges, culverts, and embankments which cross the water-drainage systems of the state requires the use of all available data, as well as current and technically sound analytical methods. The advent of improved analytical techniques, along with associated computerized capabilities, and the availability of 13 subsequent years of factual flood experience (1959-71) now make it appropriate to undertake a more detailed study of the parameters pertinent to prediction of flood magnitudes at any site in the state.

The purpose of the study will be to perform a statistical analysis of the magnitude and frequency of annual flood peaks experienced during natural flow conditions at gaging sites in Oklahoma, to relate the most important of the physical parameters of the drainage basins to peak discharges of selected recurrence intervals by appropriate diagrams, so that the reliability and versatility of methods used to estimate magnitude and frequency of peak discharges for ungaged natural drainage basins in the state of Oklahoma will be improved, and to provide a measure of the accuracy of estimates of flood magnitude and frequency.

The computer-data bank on annual flood peak discharges will be utilized to obtain the flood frequency relation at each gaged site on the basis of the Log-Pearson Type III statistical distribution. The indicated 2-, 10-, 25-, and 50-year flood discharges for each site will be related to various basin and hydrologic parameters using multiple-regression techniques. Results of the analyses will be studied in relation to geographic bias and regions having similar flood-frequency characteristics will be delineated. A report will be prepared giving techniques and diagrams useful for estimating flood frequency throughout the state.

Report has been completed and is ready for outside technical review.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0140, INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Oklahoma City, Oklahoma 73102



specifically needed by the Highway Department to provide a basis for design of highways and the accompanying hydraulic structures.

To investigate the magnitude and frequency of occurrence of flood peaks from watersheds ranging in size from one to twenty square miles by recording and analyzing flood peaks at approximately 100 locations throughout the state. To prepare a report of the investigations that will provide a basis for development in small watersheds and for design of hydraulic structures.

Install and operate about 100 crest-stage gages on small watersheds throughout the state. The sites will cover areas ranging from 1 to 20 square miles and will be selected on the basis of physiographic and climatic features. Approximately 50 percent of the sites will be equipped with type SR recording gages with precipitation attachments. The relationship of flood peaks to size of watershed and basin characteristics will be studied, utilizing multivariate statistical methods. Water records will be published in annual reports and an open file report will be prepared to cover the analytical and interpretative data.

The effort expended on this project during the year has been the continuing periodic inspection and maintenance of 60 SR recorders and 45 crest-stage gages. Current meter and indirect measurements were made of many flood flows. The 2 year and 10 year frequency floods were computed for 77 stations and the areal frequency curves of the 1964 statewide flood frequency report were extended downward to drainage areas consistent with the small streams in that area.

The major activities during the year will be (1) routine inspection and maintenance of gaging sites; (2) review discharge ratings and improve where necessary; (3) reduce the precipitation and runoff data to proper form for the Dawdy model and run the optimization program for about 35 sites; (4) simulate annual peaks for about 35 sites using long term precipitation record and do a frequency analysis on the extended data.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0141, BIG HILL LAKE, BIG HILL CREEK, KANSAS

UNKNOWN, U.S. Army, Engineer District, Tulsa, Oklahoma

Abstract: The project is located in Labette County, Kansas, on Big Hill Creek. Action consists of the construction of a lake for flood control, water supply, and recreation. Damages resulting from flooding in the creek below the dam will largely be eliminated and associated epidemic threats will be reduced. The high quality water supply will provide the need projected over the next 100 years. The lake will require that 2,700 acres of land be changed from private to public ownership. Two miles of roads will be inundated. Telephone and powerlines in the lake area will also require abandoning or relocating. Upland game habitat in the lake area will be adversely affected. There will be some temporary construction scars and there will be noise and air pollution during construction.

Pub. Jul. 72: 198p., NTIS No. EIS-KS-72-4859-D: PC \$12.00.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0142, BIRCH LAKE, BIRCH CREEK, OKLAHOMA

UNKNOWN, U.S. Army, Engineer District, Tulsa, Oklahoma

fishery, while 1,137 acres of wildlife habitat pool area will be lost.

Pub. Sep. 72: 183p., NTIS No. EIS-OK-72-53 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0143, TEST OF THE ERTS-DATA SYSTEM IN THE SUSQUEHANNA RIVER

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Harrisburg, Pennsylvania 17104

The potential use of earth orbiting satellite data for flood warning has not been well explored.

The objective of this project is to test the technology satellite data collection system gages in the Susquehanna River Basin for flood

Four data collection platforms will be field installed in the basin. Data relayed from the gages provided to the Susquehanna River Basin Commission National Weather Service's River Forecast Center, Harrisburg.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0144, OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS

B.M. REICH, Penn. State University, Institute for Resources, University Park, Pennsylvania 16802

The research involves an investigation to determine antecedent precipitation indices which are related to flood response. Joint probabilities for series of storm rainfall and antecedent conditions are calculated for different seasons, physiographic characteristics, watershed anomalies. The results of the research are applicable to small watersheds in Pennsylvania and the United States.

Research procedures will include digital computer analysis of rainfall, flood hydrographs, and watershed characteristics. Multiple and multivariate regression techniques will be used.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0145, FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS

B.M. REICH, Penn. State University, School of Civil Engineering, University Park, Pennsylvania 16802

Abstract: The objective of this study was to develop simple methods for hydrologic design of culverts for Pennsylvania watersheds in the size range of one-half to 200 sq. miles. All the annual peak discharges for Pennsylvania watersheds in this range were collected. This information was supplemented by flood hydrograph and corresponding rainfall data. Also flood hydrograph and corresponding rainfall data were collected. This information was supplemented by maps and aerial photos and soils and geological data for watersheds. From these aerial photos and maps numerous parameters describing physical characteristics of watersheds were obtained.

Pub. Sep 71: 203p., NTIS No. PB-210 317: MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation

for each water year. Floods are arranged in order of magnitude for each watershed and plotted as points on extreme value paper. Exact locations to which the data apply are described. For each plot the following information is given: major river basin in which each stream is located, stream name, area in square miles of each topographic drainage basin, number of years of data available, mean of the annual series of floods in cubic feet per second, standard deviation of the annual series in cfs, and coefficient of skewness of the logs (to base 10) of the annual series values. Practitioners are asked to judge the general trend of the observed flood curves and rate them as to fit for Gumbel lines, Log-Gumbel curves, or Log-Pearson Type III curves. Judgments as to whether a horizontal asymptote will ultimately be reached and also for except outliers are also requested. Questionnaires are included in the publication. Results for these questionnaires will be analyzed anonymously and submitted for publication in a technical journal where hydrologists can express their opinions in printed discussions.

Pub. Dec. 69: 90p., NTIS No. PB-193 704; HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0147, FLOOD INVESTIGATIONS - TENNESSEE

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Nashville, Tennessee 37203

For many vital and worthwhile purposes, man and his works must encroach upon the flood plain. Intelligent and economically feasible encroachment demands a good understanding and quantitative description of the magnitude and frequency of floods. In the design of adequate and economical bridge and drainage structures, a knowledge of the hydraulic and flood-frequency characteristics of intersected streams is essential. Additional data are needed on smaller streams to adequately define frequency relations and to provide methods of estimating the flood characteristics at specific ungaged sites.

The goal is to measure maximum annual and supplementary flood-peak stages and discharges at a network of crest-stage gages to supplement data collected under the regular gaging station program; to appraise and generalize the flood characteristics of Tennessee streams; and to define flood characteristics at specific sites for highway-structure design.

(1) Operate a network of about 90 crest-stage partial-record stations on small streams and in parts of the state where additional flood data are desirable; (2) develop statewide flood-frequency relations by multiple-regression techniques using flood-peak data from both crest-stage and continuous gaging stations and numerous basin characteristics; (3) investigate outstanding floods on ungaged streams; (4) prepare bridge-site analyses, unpublished reports; and (5) verify hydraulic techniques at sites where bridge studies have been previously made.

Routine operation of the 86 crest-stage gages continued. Eleven special bridge-site studies were made at the request of the Tennessee Department of Highways. Flood data were also furnished informally for many other proposed bridge sites. Work was completed on basin characteristics and preliminary flood-frequency analyses were made.

Continue data collection at crest-stage gages and prepare special site reports as requested by the Tennessee Department of Highways. Emphasis will be on improving state-discharge relations at the crest-stage stations and the completion of flood-frequency analyses.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

Abstract: The Report is number Two of 4 separate reports done in two phases. Phase I: Collection of data and information (Report 1). Phase II consists of three reports: (2) Comprehensive Plan; (3) Administrative Controls; (4) Capital Improvements Program. This Report is based on long-range goals and objectives, recommends residential, commercial, industrial and park expansion; proposes an inner loop system for easy accessibility to the total planning area; recommends improvements for Pecan Creek, and construction of five flood-retarding structures which will greatly enhance the aesthetic values of the community.

Pub. May 72: 126p., NTIS No. PB-212 172; PC \$8.50 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0149, HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

Insufficient data are available to develop a method that will predict the magnitude of floods for selected recurrence intervals on streams having less than 20 square mile drainage area. An acceptable method is urgently needed for the intelligent design of bridges and culverts.

To derive the 'frequency and magnitude' relationship of floods for streams having less than 20 square mile drainage area. This relationship must be continuous with that used for larger drainage areas. The derived relationship will be published in a readily usable form.

Establish and operate a network of gaging stations to collect annual maximum, flood-hydrograph, and rainfall data. Locate these stations to obtain a representative sample of all hydrologic, meteorologic, and physical characteristics. After sufficient data are obtained, appropriate analysis will be made. Methods presently used to derive the frequency-magnitude relation for large drainage areas may be refined or modified to include small drainage areas. Types of studies under consideration include Multiple-Regression Analysis, Log-Pearson Type Frequency Distribution, USGS (Dawdy) Model, and Index-Flood Method.

Data were collected and tabulated as scheduled. The physical characteristics--drainage area, main channel length, and slope index-- have been tabulated from USGS topographic maps (scale 1:24,000) for 138 sites. When maps become available, the same characteristics will be tabulated for the remaining 12 sites. Station-frequency analysis was made for small streams in East Texas.

Continue operation of the network. Update the list of physical characteristics. Tabulate long-term rainfall records and test the Dawdy Model using available data. Also, do a preliminary flood-frequency analysis for small streams in the remainder of the State.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0150, OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING

W.S. BUTCHER, Univ. of Texas, School of Engineering, Austin, Texas 78712

The proposed research will aim at the development of flood routing policy decisions using an economic objective which expresses the economic consequences of flood flows.

6.0151.

Initially flood flows will be examined at a particular location such as a dam. These inflows will be analyzed for conditional probabilities between flows in successive time periods. Parameters to be examined for possible correlation will be flow in one or two preceding time periods, precipitation at a key station, etc.

Using these conditional probability matrices, an optimal policy for flood routing will be derived using stochastic dynamic programming. The policy will be in the form of decision matrices, where the state of the system is described by the state variables used in the probability matrices of flows.

The optimal policies will be capable of being used for realtime flood routing or in model studies. They can also be used to directly evaluate the value of accuracy in flood forecasts. Where the economic objective used is a monotonic function of maximum flow, that objective function will yield the same flood routing policy as using the hydrologic one of minimizing the flood peak. The proposed method however will not be limited to that function alone and will allow more rational flood management by using realistic economic functions where damage is also related to factors such as length of time of inundation. It will also be possible to use the method to evaluate the flood control reservations in a multipurpose reservoir to compare that with the economic worth of that space if put to other use.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0151. ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS

D.R. BASCO, Texas A & M University System, School of Engineering, College Station, Texas 77843

All potential alternative solutions to water resource problems should be investigated in order to achieve optimum utilization of national financial resources allocated to water resource development. Often in the past, only reservoir impoundment structures have been considered as a solution and only alternative location or impoundment schemes have been analyzed.

The impact of traditional reservoir developments on the environment has received little attention. Increased pressure by ecologically concerned groups regarding the environment is resulting in a renewed interest in new, alternative solutions to water problems.

This research proposes to study the planned U.S. Government reservoir project on the Navasota River Watershed in Texas. The project will be directed at examining, on an engineering basis, the feasibility of alternative ways of meeting the flood control, water supply and recreation objectives of the Navasota River watershed plan. The basic Corps of Engineer planning documents reveal that only impoundment structure solutions were previously considered.

Because each proposed optimal solution to a water resources problem must be unique for the particular area of interest, especially when all alternatives are considered, a study of alternative solutions in general may not stimulate water resources planners to seek new solutions. Consequently, the case study approach would appear more valuable to (1) quantitatively document actual order-of-magnitude differences between alternatives and, (2) give publicity and a focus to the idea so that more creative solutions to the nation's water resources problems may be generated in the future.

Abstract: The proposed action consists of completion of a hurricane flood protection system to Port Arthur, Texas and vicinity from damage caused by tropical cyclones of magnitudes up to project hurricane. Started in 1966, the project includes strengthening, enlarging, and extending a local flood protection system. The completed system will include all of protective works and protect an area of about 100 square miles with a total population of about 100,000 and property values of about \$1.5 billion. The complete project included about 9.4 miles of levees, about 4.3 miles of walls, 3 major pumping stations, and numerous other appurtenant structures. Environmental impacts are described.

Pub. Nov. 73. 21p., NTIS No. EIS-TX-73-1785-1. SUPPORTED BY U.S. Dept. of Defense - Army.

#### 6.0153. MODELING THE TOTAL FLOOD PROTECTION SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III

W.H. ANDREWS, Utah State University, School of Science, Logan, Utah 84321 (C-5177)

This project is the third phase of a study which is directed toward the development of a general technique for solving metropolitan flood problems through a joint consideration of both the physical and social dimensions. The project employs simulation procedures as a technique for integrating both of these dimensions into the logic of the modeling process with respect to urban flood problems.

SUPPORTED BY U.S. Dept. of Interior - O. W. R. T.

#### 6.0154. PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I

K. UNHANANDI, Utah State University, Utah State Resour. Res., Logan, Utah 84321

This proposed research consists of the investigation of the feasibility of the multiple use of canal systems. Multiple use planning is often applied to large rivers but seldom has been concerned with canal systems. The purpose of the project is to investigate the feasibility of using canal systems for such multiple uses as flood control, drain-off, fishing, and bank recreation (e.g., cycling). The studies will include the social, economic, ecological and economic aspects. The research will be conducted in two phases; Phase I will be the investigation of the multiple use concept for the development of a canal system.

SUPPORTED BY U.S. Dept. of Interior - O. W. R. T.

#### 6.0155. REVIEW EMERGENCY RELIEF FUNDS TO DETERMINE THE TREND OF BRIDGE LOSSES DURING FLOOD CONDITIONS

F. CHANG, Unknown Inst. or Indiv. Grant, Virginia

Tasks are: Conduct a literature review to identify existing forms and to establish a procedure and design forms on which to compile and tabulate data. Provide a proposed form which field engineers can use in making damage surveys so that information is available for the Department of Transportation.

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Arlington, Virginia 22209

Few long-term runoff records exist for small drainage basins. The need for long-term records for small basins is great. The records are used in the design of highway crossings, in urban planning, and in water-resource development. The development of computer simulation models, such as rainfall-runoff relations and multivariate generating processes, will provide means for synthesizing long-term runoff records. Some of these models will permit simulation of basin response to varying environmental conditions.

The emphasis will be to study and develop, as feasibility and needs dictate, runoff simulation models to provide synthetic data for specific applications such as flood investigations, urban storm runoff, and mean monthly flows. The emphasis has been to synthesize flood peaks for rural drainage basins. Future work will encompass more complex models to synthesize urban storm runoff, daily discharge in rural basins, and combining subbasin runoff to estimate basin outflow. In areas where rainfall-runoff relations are impracticable, models such as multivariate generating processes will be developed.

Operational versions of runoff simulation models will be programmed for a variety of environmental conditions. Criteria for selection and delineation of input data for models will be developed. Methods of climate-record transposition will be investigated. Limitations in the application of each model will be explored. Approaches to the synthesis of large basin runoff through distributed routing of synthesized small basin records will be initiated. Multivariate generating processes will also be utilized to synthesize runoff.

Synthetic flood frequency data derived by rainfall-runoff modeling of 65

Continue evaluation of information content of rainfall-runoff model output (long-term synthetic flood frequency statistics). Develop 'optimum' model calibration procedures (computer programs) in relation to the worth of synthetic data.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

## HAZARD REDUCTION

### 6.0157, STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA

S.P. SNOW, Auburn University, Center for Urban & Reg. Plan., Auburn, Alabama 36830

Abstract: Act No. 119 of the Legislature of Alabama, Third Special Session, 1971, provides enabling legislation for a comprehensive land management and use program in flood-prone areas of the state, allows governmental units in Alabama to meet requirements of the National Flood Insurance Act of 1968, and authorizes the county governing body in each county to prescribe criteria for the land management and use of such areas.

Pub. Feb. 73: 188p., NTIS No. PB-225 214/6: PC \$11.50 MF \$1.45.

SUPPORTED BY Auburn University

6.0158, A GUIDE FOR REDUCING FLOOD DAMAGE IN

The Guide for Reducing Flood Damage in the South Alabama Region comprises an inventory and evaluation of the major flood prone areas of Baldwin, Escambia and Mobile Counties, Alabama. These areas were studied with the purpose of reducing or eliminating danger to human life, existing and future structures.

Land areas within flood plains subject to inundation have been delineated and the flood danger zones have been described. Proposed criterion for State, Regional or County flood plain management have been recommended and model land use controls and codes reflecting the recommendations are available upon request at the Commission's office.

Pub. Jun. 71: NTIS on HUD Reg. Off. Lib., Region IIV, 645 Peach-tree, Seventh Building, Atlanta, Ga.,

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0159, FLOOD MANAGEMENT STUDY

UNKNOWN, Tuscaloosa Area Coun. of Gov., Tuscaloosa, Alabama

Abstract: The study identifies the general extent of flooding and recommends means of flood problems. It covers all of Tuscaloosa and Pickens Counties and the Town of Moundville in Hale County. The study provides an introduction to the problem of flooding in the area and serves as a starting point for developing an areawide flood plain management program. Methods to reduce potential flood damages to structures are recommended along with restrictions for land use in flood prone areas and policies to minimize soil erosion.

Pub. May 71: 89p., NTIS No. PB-199 569: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0160, FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDVILLE, ALABAMA, MAY 1971

UNKNOWN, Tuscaloosa Area Coun. of Gov., Tuscaloosa, Alabama

This study identifies the general extent of flooding and recommends means of flood problems. It covers all of Tuscaloosa and Pickens Counties and the Town of Moundville in Hale County. The study provides an introduction to the problem of flooding in the area and should serve as a starting point for developing an areawide flood plain management program.

Methods to reduce potential flood damages to structures are recommended along with restrictions for land use in flood prone areas and policies to minimize soil erosion. Dams to reduce flooding and augment low stream flow are also recommended.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0161, FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA

A.L. KNIGHT, U.S. Dept. of the Interior, Geological Survey,

Delineate floodways for 500-year recurrence-interval flood assuming total metropolitan development. (3) Furnish data to assist in: a. designing floodway channels, b. planning and controlling development of flood plains, c. designing structures on/or crossing flood plains.

The 500-year recurrence interval flood along designated streams will be computed assuming total metropolitan development. Floodways for 500-year recurrence interval flood will be delineated for existing channel conditions and with modified channel conditions. Maps delineating flood plains and floodways will be prepared where needed. Peak discharges, flood frequency, and stage frequency will be determined for selected sites. Jefferson County will provide survey and construction work as needed.

Field surveys of valley cross sections and bridge crossings were completed on Shades Creek which consisted of 44 miles of channel. Roughness coefficients were estimated and the cross sections were coded for automatic processing in a step backwater program to determine flood plain limits. Administrative progress reports have been submitted to the Cooperator quarterly.

Complete Shades Creek Floodway Evaluation. Collect and prepare channel data on Five-mile Creek for automatic data processing in a floodway evaluation of this stream. Install and operate approximately 15 rainfall-runoff gaging stations on streams in Jefferson County.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0162, LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW

H. COHEN, Univ. of Alabama, Natural Resources Center, University, Alabama 35486

Abstract: The study reflected by this report was commissioned for two purposes. The first relates to a Wisconsin study which explores legal issues involved in the regulation of private and public land uses in the flood plains. The second part relates the present Alabama legal environment with the Wisconsin Study and suggests methods of control.

Pub. Nov. 70: 117p., NTIS No. PB-211 071: PC \$3.00 MF \$0.95.

SUPPORTED BY University of Alabama

#### 6.0163, DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL

R.F. CARLSON, Univ. of Alaska, Inst. of Water Resources, Fairbanks, Alaska 99701

A long term program of developing conceptual hydrologic modeling tools for Alaskan conditions is being conducted with this project. Present modeling programs - for snowmelt generation, potential evapotranspiration, general watershed processes, and spring breakup runoff - will be extended both with respect to regional location and to specific use. The potential usefulness of conceptual models for operational flood forecasting on the Chena River watershed will be investigated and compared to more conventional methods. Also, the project will adapt conceptual modeling techniques to the Anchorage and Kodiak regions and study the causes and effects of streamflow variability.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0164, APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES

M.L. BROWN, U.S. Dept. of the Interior, Geological Survey, Prescott, Arizona 86301

lakes and estuaries, ice packs, and urbanization of watersheds. Techniques include side-looking airborne radar, multi-spectral sensing, infrared imagery, aerial photography, thermal imagery.

Sophisticated techniques and instrumentation for airborne remote sensing of hydrology have been developed through a WRD research program and demonstrated in actual use. This project is to provide data collection services on a reimbursable basis to WRD districts, other divisions within the survey and other federal agencies by applying the techniques that have been developed. Techniques include side-looking airborne radar, multi-spectral sensing, infrared imagery, aerial photography, thermal imagery. Support will be provided as required to the developmental program.

Information will be circulated to regional and district offices concerning the services available and their costs, and requests for data will be solicited. Data collection will be scheduled in accordance with requirements of requesters. The data product will primarily be in the form of film records.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0165, DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Prescott, Arizona 86301

Development of aerial measurement techniques to be applied to hydrologic problems, such as floods, industrial or natural pollution, streamflow characteristics, dynamics of lakes and estuaries, ice packs, and urbanization of watersheds.

The research effort for development of remote sensing techniques has successfully produced sophisticated methods and equipment. Research is not required at this point. Rather, a developmental program is required in the applications of techniques resulting from the research effort, in the training of others in applications of techniques, and in the utilization of the data acquired.

Provide training for techniques in the maintenance and use of remote sensing equipment; for scientists and technicians in the utilization of data; and advise division, regional and district leaders on the availability and usability of remote sensing data; complete a handbook (manual) on remote sensing (in progress); acquire very fine, sophisticated remote sensing equipment from military sources and adapt it to the needs of the hydrologic data collection program; develop a program of real-time remote sensing. Techniques include aerial photography, side-looking airborne radar, infrared and thermal imagery, multispectral imagery.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0166, THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA

J.R. MCBRIDE, Univ. of California, School of Forestry, Berkeley, California 94720

The objective of this study is to develop models which relate changes in water yield, flood peak, sediment yield, and water quality to urbanization of a watershed in the central coast ranges of California. Water yield, flood peak, sediment yield and water quality will be monitored on a small watershed before, during, and after urbanization. Concurrent with the measurement of these stream characteristics, precipitation and soil moisture levels will be measured.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

**6.0167, STOCHASTIC HYDROLOGY**

**H.E. KUBIK**, U.S. Army, Hydrologic Engineering Center, Davis, California 95616

Analysis of multipurpose reservoirs and reservoir systems indicates need for examining a great many ways that floods can occur in combination with antecedent streamflow sequences over a period of many months or years. The number of such combinations in a record of ordinary length is extremely small, consequently there is a great need in water resources studies for a method of generating synthetic floods in conjunction with monthly streamflow generation, and for a new approach to estimating magnitudes and frequencies of large flood events (only a few of which are observed in an ordinary streamflow record). Short-interval streamflow simulation is a promising approach to satisfying this need.

Probably the greatest uncertainty in the planning and operation of water resource projects is the uncertainty of future hydrologic conditions. In planning studies it is frequently assumed that analysis of historical events will provide a satisfactory basis for evaluation of future performance. This assumption has been necessary because of the lack of satisfactory alternatives.

The goal of this research is to obtain a completely valid model for generating monthly streamflows particularly for use in the planning process. Once this capability is available, similar studies for simulating short-term hydrologic variations may be undertaken.

**SUPPORTED BY** U.S. Dept. of Defense - Army

**6.0168, PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA**

**M.W. BUSBY**, U.S. Dept. of the Interior, Geological Survey, Garden Grove, California 92643

Land use of about 85 square miles in the Perris Valley area is in the process of being changed from primarily agricultural and minor urban, to primarily urban and minor agriculture. A master plan for land use is being prepared by Riverside County and will be utilized to guide urban development in the valley. County officials recognize the need for appraising the effects of the drastic changes in land use on the hydrology of the valley.

The Riverside County Flood Control and Water Conservation District has requested the geological survey undertake an investigation to determine: (1) The basic hydrologic character of the area under present conditions; (2) Effects of urbanization on runoff characteristics, sediment production, and water quality; and (3) insofar as possible, the relation of different land use to observed changes. The results of these studies will be used in future planning in other areas in the county.

Selected sub-basins in the valley will be instrumented to measure water and sediment discharge, precipitation, and chemical quality, on the basis of existing land use and likelihood of change during the next decade. With county assistance and periodic aerial photography, records of land use will be maintained on small land units; and automated system (punch cards) will be developed to record changes. In about the fourth year, a progress report will describe the existing hydrology of the area and preliminary findings.

San Diego County, as part of the growing southern California megalopolis, has recognized the need for knowledge of the changes in the hydrologic regimen with expected changes in land use. In southern California, both sedimentation and floods are the major hydrologic problems, thus urbanization accentuates the problems.

The county wants an appraisal of the hydrology, particularly rain-fall-runoff relationships and sediment yield during floods; before and after urban development. Urbanization creates erosion and sediment problems of unknown magnitude in San Diego County. This study is to determine the cause and effect relationship with possible application to other developed areas within the county. This study would provide information useful in (1) assessing the magnitude of the erosion during the period when an area is urbanized, (2) the establishment of controls (zoning and construction) to keep erosion to a minimum, and (3) evaluation of an erosion control program if undertaken by the county.

Obtain rainfall, sediment yield, and runoff data for 7 typical areas. Document land use and changes in use with time, also changes in ground-water regimen, and in channel characteristics. Sample chemical quality of ground and surface water annually. A progress report will be prepared to describe the existing hydrology of the area and to report on preliminary findings. The time period should be flexible, but some type of progress report should be written probably within a couple of years. Tentatively the investigation would continue for ten years or if land use changes occur more rapidly, a shorter period.

Basic data network established and background information collected (streamflow, sediment loads, precipitation, land use). Investigating the applicability of different types of modeling.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**6.0170, GLENDORA, CALIFORNIA, GENERAL PLAN 1990**

**UNKNOWN**, Glendora City Government, Glendora, California

**Abstract:** The General Plan report for the City of Glendora, California is composed of six chapters. Chapter I presents the framework for planning in Glendora and indicates the purpose of the plan. Chapter II reviews and analyzes the background data concerning the planning area. Chapter III discusses the goals and objectives of the plan. Chapter IV presents the elements of the General Plan including land use, circulation and community facilities. Chapter V indicates recommended implementation techniques which can be used to put the plan proposals into effect. Chapter VI contains the total geologic report.

Pub. Sep. 70: 166 p., NTIS No. PB-196 067: PC \$3.00 MF \$0.95.

**SUPPORTED BY** No Formal Support Reported

**6.0171, CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS**

**R.D. ELLIOTT**, North Amer. Weather Consult., Goleta, California 93017

Evaluation of historic potential for increasing precipitation through cloud seeding, and suggesting that stream flow

**Purpose of study/investigation:** To investigate flow conditions and determine adequacy of the design of the various structures included in the plan.

**Progress to date:** The East Twin and Warm Creek improvement consists of three parts. The study on the rock-lined transition was completed in 1961 and reported in Los Angeles District Report No. 1-105 dated 1961. The confluence model study for East Twin and Warm Creeks and City Creek will be included in the combined Flow at Open-Channel Junctions report now in progress. The third model study is a low-flow diversion structure in a concrete-lined rectangular channel. This third study will be combined with other diversion structure studies.

**SUPPORTED BY** U.S. Dept. of Defense - Army

**6.0173, COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS**

**N.V. ARVANITIDIS, I N T A S A Incorporated, Menlo Park, California 94025**

**Abstract:** The report presents a simulation model for the evaluation of national economic efficiency benefits of various levels of flood protection and alternative land use plans. The model has three major components; (1) Calculation of flood damages and economic rent components. (2) Allocation of land use requirements. (3) Benefit calculation based on locational advantage and damage reduction. The report also presents the results of a test case in Connecticut River Basin.

Pub. Dec. 72: 155p., NTIS No. AD-765 499/9: PC \$9.75 MF \$1.45.

**SUPPORTED BY** U.S. Dept. of Defense - Army

**6.0174, COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION**

**N.V. ARVANITIDIS, I N T A S A Incorporated, Menlo Park, California 94025**

**Abstract:** The publication presents analytical progress in the development of a computer simulation model for flood plain development. A conceptual model was developed for five major parts: forecasting population and economic activities; allocating activities to available land; integrating public policies restricting land use; measuring and projecting flood damages; and evaluating benefits based on appropriate formulas involving flood damages, land rents, and locational advantages. Several concepts are introduced to solve problems associated with development of the simulation model.

Pub. Feb. 72: 87p., NTIS No. AD-742 295: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

**6.0175, PLAN FORMULATION AND EVALUATION IN MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV)**

**LIJSEN, I N T A S A Incorporated, Menlo Park, California 94025**

The overall objective of the proposed research is to present an integrated approach to plan formulation and evaluation for planning multiple purpose water resource projects. Specifically to: (a) Demonstrate that a meaningful methodology for

enable plan formulation to take particular problems and potentials of resource development. This will require characterization of the area affected by a set of regional indicators directly impact. (3) Demonstrate that plan formulation must explicitly account for alternate the affected area and extend current models to include aspects of flood recreational, aesthetic and ecological.

**SUPPORTED BY** U.S. Dept. of Interior

**6.0176, FLOODS FROM SMALL RIVERS IN CALIFORNIA**

**A.O. WAANANEN, U.S. Dept. of the Interior, Menlo Park, California 94025**

The paucity of data on the magnitude and frequency of floods on a statewide basis in small drainage areas in California and economic design of structures for such areas. Thus, an urgent need exists for a detailed interpretation of such data.

To obtain sufficient basic hydrologic data on the magnitude and frequency of floods on a statewide basis, and to obtain sufficient data for detailed hydrologic studies.

Collect flood-flow data on about 300 small rivers in the state, obtaining annual peak discharge data for a limited amount of precipitation at about 125 stations. After gages are installed at about 15 years, a regional analysis of the frequency of floods will be made. The analysis by branch of computation required during the regional flood forecasting.

From data collected as scheduled, and from data at all stations, flood-hydrographs will be developed for stations equipped with recorders. Results (maximum events) have been obtained. Simulation techniques for extended periods have been tested.

Data-collection program and flood-frequency analysis continued. Summary of data will be prepared. Final report summarizing the program will be prepared.

**SUPPORTED BY** U.S. Dept. of Interior

**6.0177, PROCEDURES FOR ANALYSIS OF FLOODS FROM SMALL RURAL WATERSHEDS**

**R.K. LINSLEY, Hydrocomp International, Menlo Park, California 94025**

**Abstract:** Flood frequency curves were compared with those observed for eleven watersheds representing a wide range of geographical conditions in this country. In the literature, four methods were selected for comparison: HSP, Regional, Potter's and extreme value straight line fitting with frequency curves. Digital computer simulation method appears to be have effect on frequency curve as indicated by the results for the watersheds. Further researches to determine characteristics and to intensively simulate watersheds are suggested for the procedures.

**6.0178, NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA**

*J.P. KENNY, Council on Intergov. Relations, Sacramento, California 95814*

**Abstract:** The report focuses on long-range physical development for a low-income minority community located in an urban floodplain. It deals with inadequate flood protection, storm drainage, air and water pollution, and lack of cultural and recreational facilities. It defines opportunities for extensive marshland preservation, outdoor environmental education, recreation, public access to the Bay, and economic development. A unique feature is its inter-agency, multi-purpose approach to plan development.

Pub. Oct. 71: 81p., NTIS No. PB-211 777: PC \$6.25 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

**6.0179, GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971**

*UNKNOWN, Council on Intergov. Relations, Sacramento, California 95814*

**Abstract:** Studies and recommendations are reported for the Lake Red Bluff area of California as related to land use, circulation, recreation, conservation/open space, and regulatory measures. Included in addition are recommendations for improved flood plain protective measures, water surface use regulations, and design improvement, along Lake Red Bluff.

Pub. Aug. 71: 54p., NTIS No. PB-210 880: PC \$4.75 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

**6.0180, FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA**

*E.M. MILLER, U.S. Dept. of the Interior, Geological Survey, Sacramento, California 95814*

Most stream-flow records in Virginia are for areas of more than 50 square miles. Additional records are needed from smaller areas in order that flood-frequency relationships may be developed. This information is badly needed for use in bridge and culvert design.

To determine flood frequencies for small drainage area sites in Virginia.

Flood-hydrograph and rainfall recorders will be installed at about 100 sites throughout Virginia. These will provide flood volume data as well as peak discharge data. The dardly rainfall runoff model will be used to extend records back in time on basis of rainfall. Data will be published in open-file report after approximately 10 years of record collection.

Peak stages and discharges published in annual water resources of Virginia.

Continue collection of flood peak and rainfall data; tabulate and compile data.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**6.0181, DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY - SUMMARY REPORT**

*UNKNOWN, San Diego Reg. Comp. Pl. Org., San Diego, California 92101*

to-date inventory of pertinent drainage and flood control information. In particular, the drainage and flood control information prepared in this study will be used as a basis for developing a regionwide plan and program. In general, the study presents physical descriptions for eight major drainage basins; analyzes urban growth factors as a part of the drainage and flood control problem; and suggests some seven possible alternative organizational arrangements for carrying out flood control work for the region.

Pub. May 70: 50p., NTIS No. PB-196 840: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

**6.0182, SEA COAST PLANNING PROJECT - CALIFORNIA**

*C. HETRICK, Univ. of California, School of Letters, Santa Barbara, California 93106*

**Objectives:** The objective of this project is to provide basic data, plan formulation, and decision procedures to assist Santa Barbara County Planning Department in formulation and analysis of alternative plans for development of the county's sea coast to obtain optimal usage, both economically and environmentally, of the finite resources. The impact of beach pollution on the development of the channel coastline will be analyzed with particular reference to natural oil seeps. Analysis and classification of the flood-debris flow hazard across permanently settled piedmont alluvial fan surfaces along the county's South Coast, with attempt to assess benefits and costs to county or homeowners should such classification be implemented. A study will be made of California's South Coast tourist and retirement industries and of public policy concerning these to assess impact on expenditure, taxation, zoning and other political or economic restraints. Data gathered through survey will be processed to determine present recreational beach use in Santa Barbara County and to predict future use and results. The development of the Channel Islands and the economic impact of oil production in the Santa Barbara Channel will be evaluated.

How information will be applied: Santa Barbara County can formulate coastal land-use plans with data on pollution impact on recreational, commercial, and residential uses made of the area. Geomorphic hazard classification will aid land-use zoning. Future beach demand can be met with informed planning and transportation patterns. County tax authorities will have data on oil production, land use, restrictive zoning, etc., on which to base realistic assessments. A comparative analysis of three proposed land use developments will be made available to decision-making bodies and will be of a nature useful for similar decisions in the future as well as for the present one.

**Accomplishments during the past twelve months:** 1. Fiscal data collected on Catalina and Santa Cruz Islands and boater data collected on local marinas. 2. Development of a model for estimating likely impact of differential tax rate structure of local taxing agencies on capital allocation by industry and area for a coastal zone. 3. Public opinion survey completed, verified open-ended questions coded, data key punched and preliminary analysis begun. 4. Pilot survey of Santa Barbara beaches completed.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

**6.0183, FLOOD HYDROLOGY INVESTIGATIONS**

*F.A. BERTLE, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225*



6.0184,

Improvement of hydrometeorological and hydrological techniques to determine flood hydrology criteria for the design and operation of Bureau dams, canals, and related facilities. Meteorological records of observed storms are analyzed to improve methods for estimating maximum probable precipitation above reservoirs. Records of large flood events are analyzed to improve methods for estimating maximum probable floods and more frequent smaller flows.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

**6.0184, DENVER METROPOLITAN AREA, COLORADO**  
**R.M. LINDVALL**, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Colorado.

The project objective is to prepare detailed general-purpose geologic maps of eight quadrangles covering the major part of the Denver metropolitan area. These maps, at a scale of 1:24,000, are designed to provide basic information on the geologic factors pertinent to maximum utilization of land in a rapidly expanding area of urban development. Information to be provided concerns the engineering properties of the surficial and bedrock units, location of potential hazards such as landslides, areas subject to flooding, areas subject to possible earthquake damage, areas of poor foundation conditions, and the location and extent of sand and gravel deposits necessary for construction aggregate materials.

The geologic maps, each including a brief descriptive text, are to be released first in open files and subsequently published in the Geologic Quadrangle Map Series. The geologic map of the Parker quadrangle was published in 1972 as the first sheet in a special Folio of the Parker quadrangle. Thirteen additional single-concept maps of the quadrangle have been or will be published in the near future to complete the Folio. The enthusiastic acceptance of the Parker Folio by planning commissions and public officials have prompted plans to issue some similar interpretive maps for the adjoining Highlands Ranch quadrangle.

A comprehensive geologic report covering all eight quadrangles is planned for the Bulletin series.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0185, MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR**

**K.L. PIERCE**, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Colorado.

The prime objective is to prepare maps showing the distribution, thickness, and infiltration characteristics of the regolith mantling hard crystalline rock in the mountainous part of the Front Range Urban Corridor. The map units will be defined to provide information concerning the suitability of the regolith (soil) for disposal of septic tank effluent without surface or ground water contamination, and the depth of excavation possible by power machinery without recourse to blasting. Also mapped (with Water Resources Division) will be the areas affected by flash floods, seasonally saturated ground, and landslides.

Mapping will be done for publication at a scale of 1:100,000 in a period of about 2 years. Water-well logs and a small

**6.0186, PEAK DISCHARGE AND SMALL WATERSHEDS IN COLORADO**  
**UNKNOWN**, U.S. Dept. of the Interior, Denver, Colorado 80225

The flood characteristics of small watersheds are poorly defined. Existing techniques for estimating magnitude and frequency of floods are applicable to large drainage areas. Also, estimates based on unit hydrographs are crude since data is lacking.

The objective of this study is to collect data and develop techniques for estimating the magnitude and frequency of floods on small watersheds. Emphasis is on the greatest degree of accuracy on watersheds in the state highway network where the information has economic significance in the design of structures such as bridges and culverts. Considerable time is devoted to research aspects of technique development.

The data for this project will be collected from stage-rainfall recorder installations distributed throughout the state so as to sample typical hydrologic environments. The present streamflow network and the Bureau's Precipitation Network in Colorado will be included in the analyses. Field reconnaissance trips to select sites, install recorders, making measurements of flow, and determining watershed parameters. Office research on technique development and

1) Operation of 43 rainfall-runoff stations continued. 2) Completed basic-data release of rainfall data collected through September 1971. 3) Storage of data at 4 stations for subsequent use in the rainfall-runoff model. 4) Basin size, channel characteristics, and slope determined for 19 basins.

1) Continue operation of 43 rainfall-runoff stations in Colorado. 2) Continue definition of basin characteristics. Begin preliminary evaluation of USGS method for estimating peak discharge.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0187, FLOOD FREQUENCY IN SMALL WATERSHEDS, COLORADO**

**UNKNOWN**, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The frequency of peak flood flows is an important factor in designing urban drainage works. Data for small watersheds and estimates made from existing unit hydrographs are to be substantially in error. The aim is to collect data on small areas and develop rainfall-runoff relationships. The data are to be extrapolated to all small watersheds in the Front Range Urban Corridor of the six-county area.

1. To collect data useful in defining relationships between peak flood intensity and duration of rainfall in the six-county area which includes Arapahoe, Boulder, Denver, Douglas, and Jefferson counties. 2. To study and develop techniques for estimating peak flood flows both in time and space.

We propose to collect rain-fall and run-off data for 100 small drainage basins in the 6-county area. The basins are selected to sample the following ranges of area, peak flood intensity, and duration of rainfall.

## MAJOR DISASTER TYPES

outflow from each basin, supplemented by crest gages to record peak stages at other locations.

- 1) Operation of 30 rainfall-runoff stations in Denver metropolitan area continued.
- 2) Completed basic-data release of all rainfall-runoff data collected through September 1971.
- 3) Began computer storage of data at 2 stations for subsequent use in USGS rainfall-runoff model.
- 4) Began preparation of basic-data release for the May 5-6, 1973, storm in the Denver area.

- 1) Continue operation of 30 rainfall-runoff stations in Denver metropolitan area.
- 2) Begin definition of basin characteristics such as drainage area, percent impervious cover, and channel slope.
- 3) Complete report on May 5-6, 1973, storm.
- 4) Begin preliminary calibration of USGS model on 2 basins.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 6.0188, HAMILTON 2 DEGREE

J.D. WELLS, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Montana and Idaho.

Prepare a geologic map of the Hamilton 2-degree sheet at 1:250,000 scale, integrating the past, current, and future pertinent mapping done by industry, universities, and State and Federal agencies, and incorporating geologic, geochemical, isotopic, and geophysical data as a basis for evaluation of land use and mineral potential. Special purpose interpretative maps and reports will be prepared of appropriate areas where potential hazards such as landslides, unstable foundation material, faulting, earthquakes, and flooding are present. An evaluation of known and potential mineral resources of base and precious metals and fluorite along the margins of the Idaho Batholith and stratabound copper in the Beltian strata will be made. These data will contribute to the general body of geologic knowledge of the northern part of the Idaho Batholith and contribute in developing the regional structural, stratigraphic, magmatic, metamorphic, and erosional patterns. They will further provide a proper basis for land use planning for the diverse interests in this area of urban development in an outstanding recreational area.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 6.0189, INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES

D. SIMONS, Colorado State University, School of Engineering, Fort Collins, Colorado 80521

Objectives: 1. Channel stabilization in the vicinity of and downstream of culvert outlets. 2. Channel stabilization in the vicinity of and downstream of bridges. 3. The use of special methods and techniques where there is no gravel or rock and where special problems arise.

Approach: Utilized three different sizes of laboratory flumes to obtain data. Subsequently, limited field data were collected to help establish validity of results.

SUPPORTED BY Wyoming State Government - Cheyenne

### 6.0190, HYDROLOGY OF SMALL WATERSHEDS

V. YEVJEVICH, Colorado State University, School of Engineering, Fort Collins, Colorado 80521 (2R23231413)

A systematic way of assembling, storing, and recalling data from floods recorded on small watersheds has been

version to housing subdivisions, various aspects of erosion, etc. It has been shown that much of the flood data can be clearly related to change in the response of the watershed. The Colorado State University watershed data file has been expanded to include urbanized watersheds and floods resulting from snowmelt.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Colorado State University - Fort Collins

### 6.0191, SOCIALLY DEFINED ENVIRONMENTAL VALUES IN URBAN WATER RESOURCES PLANNING

D.W. HILL, Resources Development Consult., Fort Collins, Colorado 80521 (C-4222)

This research seeks to develop objective social criteria in developing and employing evaluating procedures to account for trade-offs and interactive effects of environmentally related social values. The values will be identified, then incidence and intensity rates measured on the basis of data drawn from three stratified urban samples. One sample will be located in a short water area, one in a pluvial area, and the last in a modestly short-water area. Values to be identified and measured include water quality values, attitudes toward effluent, recreation values, personal and aesthetic amenity, and flood plain management and flood control values.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Div.

### 6.0192, RECOMMENDED REGIONAL PLANNING FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT

UNKNOWN, Valley Regional Planning Agcy., Ansonia, Connecticut 06401

Abstract: The report presents the recommended regional plan and program for sewerage, water supply and storm drainage for the 58 square mile Valley Planning Region, Ansonia, Derby, Seymour, and Shelton, Connecticut.

Pub. Feb. 70: 92p., NTIS No. PB-192 940: HC \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0193, SMALL STREAM FLOOD CHARACTERIZATION

M.D. THOMAS, U.S. Dept. of the Interior, Geological Survey, Hartford, Connecticut

Records of streamflow are relatively plentiful on medium and larger streams in Connecticut. However, records on small streams, especially those below 10 square miles, are extremely limited. There is an immediate need for information on the magnitude and frequency of flood discharges on these areas. Project should continue until at least 10 years of record have been completed.

To provide flood flow information at many new sites in Connecticut on streams with small drainage areas. Use information to supplement similar information at other sites to continuous records to improve or develop a new formula for Connecticut based on basin characteristics.

Establish and maintain a crest-stage gage network in Connecticut and prepare a stage-discharge rating station. Analyze records of annual peak discharges with respect to frequency, regional characteristics, drainage

ing 1973 data. Continuation of flood frequency analysis.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0194, ANALYSIS OF LAND USE CONTROL MEASURES

W.D. ANDERSON, U.S. Dept. of Agriculture, Natural Resource Econ. Div., Washington, District of Columbia 20250 (NRE3-3-54-00)

Objective: Appraise the status of and analyze developments in rural zoning enabling statutes and zoning ordinances, and analyze what is being done under rural zoning ordinances.

Approach: Examination, analyses, and classification are made of all State rural zoning enabling statutes which empower counties, townships or other governmental units to adopt ordinances and regulations. Rural zoning ordinances and regulations enacted by local governmental units are collected, analyzed, and classified. Analyses are made of rural zoning as it relates to agriculture and natural resource uses. Special attention is directed at significant zoning innovations and related land use control techniques.

Progress: Substantial demands for staff assistance on land use policy issues continued. Preliminary analyses were made of techniques for preserving agricultural land. Several earlier reports resulting from this research project were reprinted.

SUPPORTED BY U.S. Dept. of Agriculture - E.R.S.

#### 6.0195, KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

Abstract: A watershed project is to be carried out in Butler and Chase Counties, Kansas. The project proposes conservation land treatment over the two watersheds, supplemented by 30 floodwater retarding structures. Project action will: eliminate agricultural use and wildlife habitat of 1,115 acres of cropland, grassland, and woods in the sediment pools; inundate about 18 miles of intermittent stream channels; and interrupt agricultural and wildlife uses of 3,349 acres in the planned detention pools.

Pub. Mar. 72: 64p., NTIS No. PB-200 794-F: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Agriculture

#### 6.0196, UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

Abstract: The Union Creek watershed for flood control and land stabilization is located in Union County, South Dakota. Adverse environmental effects which cannot be avoided are about 5 miles of intermittent stream channel, 40 acres of cropland, and 55 acres of grassland which will be inundated by the sediment pools. Agricultural and wildlife use will be periodically interrupted in the floodwater detention pools. The use of 50 acres of land in dams, spillways, and grade stabilization structures will be temporarily lost to agricultural and wildlife until the areas are re-vegetated.

Pub. Feb. 72: 31p., NTIS No. PB-206 620-F: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Agriculture

Abstract: The Hollow Creek Watershed Project, located in Lexington and Saluda Counties, South Carolina, proposes conservation land treatment over the watershed, supplemented by two floodwater retarding structures. Adverse environmental effects include the following: The impoundment will destroy agricultural use and wildlife habitat on four acres of pasture land and 87 acres of woodland; The retarding pools will periodically interrupt agricultural and wildlife use on an additional 16 acres of pasture land and 125 acres of woodland; Increased vehicular traffic will occur in the vicinity of the floodwater retarding structures; One and one-half miles of stream channels will be inundated.

Pub. Oct. 71: 10p., NTIS No. PB-203 233-D: PC \$3.00.

SUPPORTED BY U.S. Dept. of Agriculture

#### 6.0198, KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

Abstract: The projects propose conservation land treatment over two watersheds, supplemented by 30 floodwater-retarding structures. The combined project area for the North and South Sector Upper Walnut River Watershed plans consists of about 282,000 acres and is located in Butler and Chase Counties, Kansas. Approximately 18 miles of intermittent stream channels will be inundated by the planned sediment pools. Agricultural use and wildlife habitat in the 1,115 acres to be occupied by the sediment pools will be lost. Agricultural and wildlife use of the 3,349 acres in the detention pools will be periodically interrupted by floodwaters. Agricultural and wildlife use in the 220 acres to be occupied by dams and spillways will be lost until vegetation is established immediately after construction. There will be project induced evaporation losses in the sediment pools which can reduce low flows in stream reaches below the reservoirs if releases are not made during periods of low flow as required by the Kansas Division of Water Resources.

Pub. Jul. 71: 16p., NTIS No. PB-200 794-D: PC \$3.00.

SUPPORTED BY U.S. Dept. of Agriculture

#### 6.0199, NUTWOOD WATERSHED, ILLINOIS

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

Abstract: A watershed project to be carried out in Jersey and Greene Counties, Illinois by three sponsoring local organizations with federal assistance will include land treatment measures supplemented by three floodwater retarding structures, two water level control structures, and one pumping station. The land treatment program will reduce average annual upland erosion, promote more efficient land use, and reduce water runoff. Combined land treatment and structural measures will reduce sediment and flood water damages. Forty-eight hundred acres of bottomland will benefit from flood control, improved drainage, and more intensive land use. Approximately 40 acres of lake fishery and aquatic habitat will replace 40 acres of pasture. Approximately 37 acres of woodland and pasture will be periodically inundated by flood detention pools. Construction of the dams and spillways will temporarily disturb or destroy the vegetative cover on an additional 38 acres.

Pub. May 72: 24p., NTIS No. EIS-IL-72-5155-D: PC \$3.25.

SUPPORTED BY U.S. Dept. of Agriculture

**6.0200, HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The proposed project measures consist of accelerating the on-going land treatment program, installing three floodwater retarding structures, and improving about four miles of channel in Hopkins County, Kentucky. The project will take 48 acres of agricultural and forestry land for sediment pools and structure areas, disrupting or temporarily delaying the use on another 126 acres in the flood pools and other affected areas, and increase the potential for problems associated with population growth and economic expansion.

Pub. Jan. 72: 30p., NTIS No. PB-203 511-F: PC \$3.00 MF \$0.95

**SUPPORTED BY** U.S. Dept. of Agriculture

**6.0201, CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The project consists of land treatment and floodwater retarding structures in Hudspeth County, Texas, and Otero County, New Mexico, for the purpose of watershed protection and flood prevention. Environmental effects are generally beneficial. Agricultural production will be eliminated or interrupted on considerable acreage.

Pub. Nov. 72: 56p., NTIS No. EIS-NM-72-5708-F: PC \$5.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Agriculture

**6.0202, BIG CREEK WATERSHED, KANSAS**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The project located in Coffey, Lyon, Greenwood and Woodson Counties, proposes conservation land treatment over the watershed supplemented by nine floodwater-retarding structures. The project action will: reduce floodwater and sediment damages on 8,350 acres of flood plain land; Reduce erosion; Provide 148 surface acres of water for fishing, recreation and feeding and resting areas for migratory waterfowl at the sediment pools of planned floodwater-retarding structures; Eliminate agricultural and wildlife use of 340 acres in the sediment pools; Inundate about 8 miles of intermittent stream channel.

Pub. Jun. 71: 32p., NTIS No. PB-200 808-F: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Agriculture

**6.0203, MACADOO ROAD-FILL DAM, KANSAS**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The statement presents information for the MacAdoo Road-Fill Dam, project located on Elm Creek, a tributary of the Medicine Lodge River. The project measure area consists of 39,617 acres and is located in Barber and Pratt Counties, Kansas. The project will retard runoff, reduce soil erosion, sedimentation, give 35 farms flood protection benefits on 1,290 acres, provide fishing, and reduce the sediment of the stream. The adverse environmental effects would be the tem-

**6.0204, STARKWEATHER WATERSHED, NORTH DAKOTA**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The project is located in Ramsey and Cavalier Counties, North Dakota and proposes conservation land treatment over the watershed, supplemented by 60.6 miles of channel improvement for flood prevention and agricultural water management. Channel improvement will drain 345 acres of Types 3, 4, and 5 wetlands. One hundred and five acres of upland habitat will be destroyed by channel improvement. Groundwater recharge will be reduced. The man-made appearance of the constructed channels will not be as in their natural undisturbed state. Wildlife systems now existing in the area of the proposed channel construction will be altered. The potential exists for local interests to extend the project measures to drain the equivalent of 4,000 acres of existing wetlands not preserved by easement or purchase.

Pub. Aug. 71: 10p., NTIS No. PB-202 150-F: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Agriculture

**6.0205, VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The following statement presents information on the Verde Lane Flood Prevention Project located South of the Town of Sidney in Cheyenne County, Nebraska. The watershed covers an area of 542 acres with 138 acres in urban development, 292 acres of range land. The environmental impacts of the proposed project are: Conservation land treatment to limit erosion and sediment production to less than five ton per acre per year; Reduce by 75 percent delivery of sediment to Lodge Pool Creek; Eliminate floodwater damages from a 100-year storm; Reduce by 75 percent sediment transport to Verde Lane drain; Fenced in area will provide three acres of undisturbed nesting cover. The adverse environmental effects are: Agriculture production will be lost on four acres of embankment and spillway area; Temporary loss of wildlife habitat; Construction of the dam will disturb vegetative cover on approximately six acres.

Pub. May 71: 22p., NTIS No. PB-199 021-F: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Agriculture

**6.0206, WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA**

*UNKNOWN*, U.S. Dept. of Agriculture, Soil Conservation Service, Washington, District of Columbia 20250

**Abstract:** The Whitewater Creek drainage basin comprising 19,738 acres (30.84 sq. mi.) is located approximately eight miles northeast of Jay, Oklahoma, in Delaware County. The 1,054 acres of floodplain land in the watershed are subject to frequent and severe flooding. Major floods covering more than half of the floodplain can be expected about once every three years. The project consists of conservation land treatment practices and three floodwater retarding structures. Conservation land treatment will reduce soil loss on the upland by approximately 10 percent. The completed project

scenery, however, this will be offset somewhat by re-vegetation of disturbed areas and by the addition of a body of water to the landscape.

Pub. May 71. 12p. NTIS No. PB-199 653-F; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Agriculture

#### 6.0207, LAKE HYDROLOGY

L. BAJORUNAS, U.S. Dept. of Commerce, Limnology Division, Washington, District of Columbia

Description: Data are being gathered and analyzed on water quantity factors, such as inflow, outflow, precipitation, and evaporation in order to obtain a better understanding of their interrelationships and their effects on the Great Lakes. Data related to ice and snow formation, accumulation, composition, and decay; time and areal distribution; and structural and crystallographic features are also acquired over the Great Lakes. These data are analyzed and then correlated with physical, hydrologic, and meteorologic conditions and forecasting methods developed. The water level and ice forecasts will enable the commercial navigation to utilize the full load capacity and to extend navigation into the winter. Water supply forecasts improve lake level regulation and provide information to shore property owners on potential flooding and erosion.

Technical objective: To develop or improve methods to forecast water supply, lake levels, and the formation, extent and breakup of ice cover.

Implementation: To accomplish its purpose, the task is broken down into the following Work Units for specific activities: Hydrologic Data Base; Lake Precipitation; Lake Evaporation; Ice Cover Distribution; Ice Characteristics; Ice Forecasting.

Part I of 7.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0208, HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA

COOK, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

The objective of this project is to develop an accurate method for estimating flood runoff of various recurrence intervals on small rural watersheds, with drainage areas of less than 20 square miles, in the state of Indiana.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0209, INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION TO THEMATIC MAPPING, MISSISSIPPI RIVER

D.T. EDSON, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Abstract: The author has identified the following significant results. Theme extractions, enlarged to proper scale can prove a simple and convenient tool for evaluation of small scale map content, and as a guide to and for map revision. Open water extractions provide a graphic, easy to read, historical documentation of the recent Mississippi River flood at successive times during the flood period. Open water extractions, used in conjunction with swamp-wetland extractions, can be used to document and monitor temporal changes in wetland water levels.

Pub. Jul. 73: 5p., NTIS No. E73-10952; PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

J. HORTON, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Crest stage indicators have been installed on streams in Connecticut. The drainage area ranges from 1.20 sq mi to 10.4 sq mi and are chosen to give wide coverage to the state and correlation of results with those from record primary gaging stations of the USGS. The date of crest occurred is determined from a study of and from the record of adjacent primary station discharge is computed from the characteristic way opening at the gage site and/or from discharges made by USGS at times of flood. The project is expected to lead to a more accurate method of forecasting flows of streams having drainage areas of from 10 sq mi. Since the start of this program in 1961, floods at each of the long-term stations in Connecticut seldom exceeded the long-term mean annual flood of an extended period of drought in this area. Estimates of long-term mean annual floods have been made at the crest stage sites under this program based on long-term mean annual floods to short-term floods at the long-term stations. These ten estimates cannot be confirmed, however, until additional data on the short-term mean annual floods more near the long-term mean annual floods at the long-term stations. USGS is now re-analyzing data in an attempt to correlate short-term (8 yrs) to long-term floods.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0211, HYDROLOGY OF OUTSTANDING FLOODS

E.J. KENNEDY, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R2)

Research projects are being conducted in 4 states to select and compile data on major and unusual floods. Analyze data from outstanding floods and compile findings of other research projects.

Document provided to SSIE by Highway Research Board Service.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0212, INVESTIGATION OF SCOUR AT BRIDGES - ALASKA

L.S. LEVEEN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R2)

Scour at bridges in Alaska is being studied at 10 sites in the field. Initially only reaches where a bridge has failed or a relatively straight section of the stream channel has been destroyed. The stream channel is surveyed upstream and downstream of the bridge. Cross sections are taken and profiles of the stream bed are taken with an echo sounder. Key discharges. Hydraulic and transport variables include sediment size analysis, current metering, stage-discharge and depth-discharge relationships, measurements of suspended load, size analysis of sediment, velocity distribution at various stages, measurement of depth, and determination of the discharge-free water surface. It is believed that analysis of the data will lead to predicting scour at bridges.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - Federal Highway Administration

#### 6.0213, FLOOD FREQUENCY OF ALABAMA RIVERS - ALABAMA

U.S. Geological Survey Circular 342, Floods in Alabama, Magnitude and Frequency, has been updated and refined on the basis of 12 additional years of stream flow record. Flood frequency relations are being developed for small watersheds in Alabama on the basis of rainfall-runoff relations, long term weather records and physiographic factors.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0214, FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA

C.O. MING, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

This project is aimed at providing a method for estimating the magnitude of floods in watersheds of 1 to 15 square miles in Alabama. For several small watersheds, the functional relation between storm rainfall characteristics and peak flow on the basis of available records of rainfall and stream flow will be defined for each watershed. A long-term flood-frequency curve will be synthesized for each gaged watershed. These results will be extrapolated to ungaged watersheds by correlation with topographic and climatic variables.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Alabama State Government - Montgomery

#### 6.0215, FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS

H.C. RIGGS, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Purpose: To determine the factors and physical relationships that control the frequency and magnitude of floods on small drainage basins (generally less than 15 square miles and many less than 2 square miles), and develop reliable methods for estimating peak discharges.

Methods: Depending on the climatic and other features of the particular region, various methods and combination of factors are analyzed and tested for reliability, based on past and current records of flood flow, or synthesized floods. These factors include basin shape, slope, geology, vegetative cover, land use, antecedent precipitation, runoff volumes, peak discharge, and rainfall intensity and duration.

Geographical scope: Work is being conducted in 35 states and Puerto Rico as part of the program of water resources investigations conducted by the Geological Survey in cooperation with the States.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0216, WATER RESOURCES INVESTIGATIONS

F.B. SAUER, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R23227353)

Analytical techniques, along with computerized capabilities, and the availability of 13 subsequent years of factual flood experience (1956-1971) make it appropriate to undertake a more detailed study of the parameter pertinent to prediction of flood magnitude. The study will utilize annual peak data published through 1971. Data for contiguous areas in adjacent states will be included as appropriate. The computer-data bank on annual flood peak discharges will be completed through the 1971 water year. The frequency relation of annual flood peaks of each gaged site will be computed on the

be related independently to various basin and hydrologic parameters using multiple-regression techniques. Because of the short length of records for areas of less than 50 square miles, only the 2-, and 10-year flood will be included in the multiple regression studies. However, techniques for estimating the 25- and 50-year floods will be provided. Results of the analyses will be studied in relation to geographic bias or other factors that might reasonably be expected to have some distinguishing influence on flood-peak runoff characteristics. Regions having similar flood-frequency characteristics will be delineated if necessary to minimize the standard statistical errors

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0217, INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA

W. THOMAS, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242 (2R23227354)

The magnitude and frequency of flood peaks in one to fifty square mile watersheds were investigated. 100 crest-state and recorder gauges were installed and library research was conducted. Flood discharges will be computed by hydraulic principles and flood characteristics will be studied.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0218, IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Flood mapping is used in nationwide programs of flood-zoning regulation and flood insurance. The work is done by several federal agencies and, in adjacent areas, significant inconsistencies in the 100-year flood boundary, for example, occur despite general adherence to recommended guidelines for flood frequency-analysis. This is because alternate treatment is possible at several stages of the analysis. States and municipalities that administer the programs are concerned with the inconsistencies and have called attention to them in official quarters.

The objective is to resolve some of the major causes for differences in flood-frequency results. Specifically, the studies will attempt 1) To develop rules for elimination of outlying observations, high or low, that are not representative of the period of record, 2) To determine the best treatment of skew at a station, and 3) To determine the validity and proper use of the 'expected probability' adjustment.

The outlier problem will be studied by computer simulation. A national map of skew values will be prepared; alternative methods of using skew values (mapped or sample) will be tested for actual or simulated data, for both station curves and regional curves. The 'expected probability' adjustment will be tested against the results of multiple regression results now available.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0219, INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN

any small watershed in South Dakota. The method derived will be used for design of highway culverts and small bridges. C. Schuerch, J. Polymer Sci. Part C, No. 36, P 231, 1971. 'Status of Ammonia Treatment of Wood and Wood Products', C. Schuerch, SUNY College of Environmental Science and Forestry Publication prepared for the 7th Cellulose Conference, 1971. 'Radial-Tangential Shrinkage of Ammonia-Treated Loblolly Pine Wood', R. A. Parham and C. H. De Zeeuw, Wood Science, 4:3:129, 1972.

Document provided to S.S.I.F. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0220, DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Urban runoff must be managed for flood prevention and pollution abatement. Hydrologic data on rainfall-runoff-water quality relationships are urgently needed to assess management alternatives.

Development of a real-time urban data network to collect rainfall-runoff water quality data in urban environments.

Flow-measuring devices and associated instrumentation will be developed and adapted into an integrated real-time data network for collecting rainfall-runoff-water quality data in the San Francisco area.

A flow-measuring device has been designed and tested for measuring flow in pipes under open-channel and pressurized flow.

Continued collection of hydrologic data, possible expansion of data-collection network.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0221, PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Abstract: A comprehensive guide to a study of the 9-county San Francisco Bay Region describes a 4 year research-demonstration study conducted jointly by the Geological Survey and the Department of Housing and Urban Development, designed to improve urban development decisions and land-use planning through application of innovative earth science concepts. Urban-related environmental studies include: active faults and earthquake hazards, landslides and slope instability, physical and chemical properties of San Francisco Bay and its circulation patterns, water-quality and pollution, areas subject to flooding, water supply and waste-disposal systems, and available mineral and water resources. Planning program elements described include state-of-the-art review and analysis, a feasibility study of incorporating earth-science data into urban planning information systems, and application and demonstration studies.

Pub. Oct. 71: 121p., NTIS No. PB-206 826: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

developed for predicting the magnitude and frequency of floods from any small watershed in South Carolina. The method will be used in highway culvert and small bridge design.

Document provided to S.S.I.F. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0223, STANDARDS FOR PLANNING WATER RESOURCES

UNKNOWN, U.S. Water Resources Council, Washington, District of Columbia 20037

Abstract: The document is a report on standards for planning water resources by comparing, measuring, and judging benefits, costs, and alternatives.

Pub. Jul. 70: 296p., NTIS No. PB-209 176: PC \$0.95.

SUPPORTED BY U.S. Water Resources Council, D.C.

#### 6.0224, A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES

UNKNOWN, U.S. Water Resources Council, Washington, District of Columbia 20037

Abstract: With the growing need for improved flood management, desirability of a basic, uniform method for establishing flood frequencies for general use throughout the Nation is manifest. A consistent approach to estimating the average annual value of flood losses--a major component in determination of the best measure of flood risk--is a combination of measures, in flood plain management, dependent upon equitable analysis of flood frequencies determined by Federal, State, local government engineers. With this need in mind, the uniform technique for determining flood flow frequencies is set forth in this bulletin.

Pub. Dec. 67: 17p., NTIS No. PB-209 116: PC \$3.00.

SUPPORTED BY U.S. Water Resources Council, D.C.

#### 6.0225, FLOOD HAZARD EVALUATION GUIDE FOR FEDERAL EXECUTIVE AGENCIES

UNKNOWN, U.S. Water Resources Council, Washington, District of Columbia 20037

Abstract: In order to provide equitable treatment of flood problems among Federal agencies, several Federal agencies have established a work group to develop uniform guidelines and criteria for implementation of the executive order.

Pub. May 72: 26p., NTIS No. PB-210 850: PC \$0.95.

SUPPORTED BY U.S. Water Resources Council, D.C.

#### 6.0226, REGULATION OF FLOOD HAZARD AND LOSS - REDUCE FLOOD LOSSES - VOLUME I, PART I

UNKNOWN, U.S. Water Resources Council, Washington, District of Columbia 20037

Abstract: This report is the first of a series of three

**UNKNOWN**, U.S. Water Resources Council, Washington, District of Columbia 20037

**Abstract:** The report discusses the steps made toward development of a comprehensive water and related land resources management program for the region: regional courses of action toward effective management of flood plains, toward state leadership in coastal zone planning and management, and toward ways of making decisions about siting of electric power plants.

Pub. Jun. 71: 57p., NTIS No. PB-209 169: PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Water Resources Council - Wash., D.C.

**6.0228, OHIO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U. S. WATER RESOURCES COUNCIL. (AB-BREV)**

**UNKNOWN**, U.S. Water Resources Council, Washington, District of Columbia 20037

**Abstract:** The report describes a comprehensive program for water and related land use in the Ohio River Basin.

Pub. Jul. 71: 627p., NTIS No. PB-209 712: PC \$9.00 MF \$0.95.

SUPPORTED BY U.S. Water Resources Council - Wash., D.C.

**6.0229, FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES**

**UNKNOWN**, U.S. Water Resources Council, Washington, District of Columbia 20037

The guidelines presented in this document have the primary purpose of assisting Federal executive agencies towards attaining equability in developing their own guidelines for the treatment of flood hazard problems when implementing Executive Order 11296.

The guidelines also provide agencies with basic policies and technical standards recommended for adoption when complying with Section 6 of the Executive Order, which states that each executive agency shall "... develop such procedures, regulations, and information as are provided for in, or may be necessary to carry out, the provisions of Section 1, 2 and 3 of this order".

Pub. May 72: 22p., No copy info. available.

**Abstract provided by FDAA.**

SUPPORTED BY No Formal Support Reported

**6.0230, GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA**

**W. ANDERSON**, U.S. Dept. of the Interior, Geological Survey, Ocala, Florida 32670

Water levels in the closed sinks in southwestern Seminole County, Florida, were much higher in 1960 than any observed prior to or since that time. Intensive development of the area has resulted in pressure to utilize some lands that lie below the high levels of 1960. In order to evaluate risks of flood damage to the development, the frequency of occurrence of the 1960 floods and of lesser floods needs to be established. Further, it is desirable to know the relations between the water table surface, the water table and surface water, and the water table and surface water.

Stage records of water bodies in the sinks and of a lake resting on highly impervious materials will be collected. These records will be equated with rainfall and evaporation records to evaluate infiltration rates in the sinks. Rainfall records for the area will be analyzed to determine the frequency of the 1959-60 rainfall total. Water levels in wells will be measured.

Stage record for 4 sinks, 1 water-table lake and one artesian well were obtained to mean sea level datum. Peak stages for the 1960 flood were determined for some sinks. Rainfall records were analyzed to determine the frequency of the 2-year rainfall total for the period October 1958 to September 1960. Relative net seepage rates from lakes and sinks in the area were determined.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0231, SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS**

**E.R. BARTLEY**, Tampa Bay Regional Plan. Coun., St. Petersburg, Florida

**Abstract:** Contents: Sarasota's authority to zone; The existing Sarasota zoning code (The legislative context, the judicial context, the executive); District regulations; Special problems--treatment of non-conformities; The current Sarasota zoning code; The current Sarasota subdivision regulations.

Pub. Jan. 70: 185p., NTIS No. PB-195 647: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0232, ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA**

**UNKNOWN**, Tampa Bay Regional Plan. Coun., St. Petersburg, Florida

**Abstract:** The report is the new County of Sarasota, Florida Zoning Ordinance. The new regulations include modern zoning techniques such as performance standards, Planned Unit Development, Planned Industrial Districts, and site plan approval requirements. Provisions which are aimed at conservation and environmental protection are also inserted, such as landscaping and buffering, flood plain zoning, and tree protection requirements.

Pub. May 72: 164p., NTIS No. PB-211 746: PC \$10.25 MF \$0.95.

SUPPORTED BY Florida State Government - Tallahassee

**6.0233, MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA**

**W.C. BRIDGES**, U.S. Dept. of the Interior, Geological Survey, Tallahassee, Florida 32304

Previous studies have defined the flood characteristics of streams having drainage areas larger than 20 square miles, but similar data are lacking for small drainage areas in Florida. A significant part of the annual flood losses occurs on small streams. Small-stream culvert crossings represent approximately one half of the highway funds spent annually on drainage structures. Adequate information on flood characteristics of small streams will minimize flood costs through economic design of drainage structures and storage



of information needed to design drainage and flood-control structures, to establish realistic zoning ordinances, and to set equitable insurance rates.

At 30 to 40 small-basin sites, define the relationship between peak flow and storm rainfall from concurrent records of streamflow and rainfall collected over a period of 10 years (25 to 30 significant events). Using long-term rainfall records and the peak flow-rainfall relationship, synthesize a long-term flood-frequency curve for each gaged site. Derive by use of multiple-regression methods regional flood-frequency curves that can be applied at an ungaged site.

Thirty-three gaging stations are currently in operation in the statewide.

Tabulate long-term daily evaporation data for Florida NWS Stations: Select outstanding storm-rainfall events and tabulate 5-minute unit rainfall for Jacksonville and Tampa. Run trial calibration for two small-basin stations in Northwest Florida.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0234. HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA

J.F. TURNER, U.S. Dept. of the Interior, Geological Survey, Tampa, Florida

Moderate flooding in the lower Hillsborough River would cause considerable property damage to urban developments that are appearing on the immediate flood plain. Flood control structures have been proposed, and analytical methods, related to the operation of these structures, as well as flow simulation, are needed in ascertaining desired water levels in the lower Hillsborough. Flooding, associated with large regional storms, particularly hurricanes, could cause immense property damage and loss of life if advance flood warning is not provided to residents of critical low-lying areas in the Alafia and Anclote river basins.

(a) To develop a mathematical (computer) model of the Hillsborough River that simulates the entire streamflow hydrograph. The model would allow maintenance of desired water levels in lower reaches of the Hillsborough River. Provisions would be included for operation of a proposed system of flood control structures. (b) To develop mathematical (computer) models that simulate flood hydrographs at selected points on the Alafia and Anclote Rivers.

For the Hillsborough River, flood volume will be simulated in sub-basins by methods based on rainfall-runoff theory, accumulated at the main stream, and routed downstream through the flood control structures by use of energy and continuity equations governing flow in open channels. Base-flow component of the hydrograph will be approximated by empirical equations describing ground water discharge. Flow routing will be constrained by and dependent on desired water levels in lower regions of the basin. Flood hydrograph models based on rainfall-runoff theory, will also be developed for the Alafia and Anclote Rivers.

Progress during the year includes: (1) completion of report covering development of flood profiles of lower Hillsborough River; (2) realignment of streamflow, rainfall, and ground water monitoring network and installation of telemetry equipment at key streamflow station; (3) completed rainfall and evapotranspiration subroutines for basin model and determination of basin, reservoir, and channel routine parameters;

#### 6.0235. FLOOD PLAIN STUDY AND MODELING - FLOOD PLAIN ORDINANCE

UNKNOWN, Palm Beach Co. Area Plan. Bd. of Supervisors, Palm Beach, Florida 33404

Abstract: The report deals with the flooding problems of the Eastern Coastal Areas of Palm Beach County and offers methods by which the more serious effects of heavy flooding could be minimized or avoided. Sections of the report are concerned with the patterns of development in the County, a review of past flooding situations in the County, and the determining of flood criteria as established by the Corps of Engineers, U.S. Army. Also included are proposed Flood Hazard Ordinance criteria, a review of Flood Hazard District, Flood Proofing criteria, Subdivision and methods of controlling coastal flooding.

Pub. Mar. 72: 56p., NTIS No. PB-213 521/9: 1972, \$0.95.

SUPPORTED BY Palm Beach County Government

#### 6.0236. FLOOD PLAIN STUDY AND MODELING - FLOOD PLAIN ORDINANCE, MARCH, 1972

UNKNOWN, Palm Beach Co. Area Plan. Bd. of Supervisors, Palm Beach, Florida 33404

Analysis of past flooding conditions in Palm Beach County and projection of future floods and recommendations for flood prevention measures.

This report deals with the flooding problems of the Eastern Coastal Areas of Palm Beach County and offers methods by which the more serious effects of heavy flooding could be minimized or avoided.

Sections II and III of the report are concerned with the patterns of development in Palm Beach County, a review of flooding situations in the Eastern areas and the determining of flood criteria as established by Corps of Engineers, U.S. Army. Past flooding studies conducted by various agencies are examined and early community participation in the Federal Flood Insurance Program is examined.

Section IV is basically an overview of the Federal Flood Insurance Program as presented in revised form in the Flood Hazard Ordinance.

Section V analyzes the existing Flood Hazard Ordinance, Flood Hazard Districts and Regulations presently in force in the Palm Beach County area.

Section VI presents proposed regulatory controls for flood damage in the urbanized areas of Palm Beach County. Included are proposed Flood Hazard Ordinance, Flood Hazard District, Flood Proofing criteria and methods of controlling coastal flooding.

Section VII summarizes the data presented in the report. Pub. Mar. 72: NTIS or Area Plan. Bd. of Palm Beach County, 1548 W. Datura St., P.O. Box 1548, W. Palm Beach, FLA. 33404

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0237. IMPLICATIONS OF ZONING AS A FLOOD CONTROL AND WATER MANAGEMENT MEASURE - GEORGIA

C.F. FLOYD, Univ. of Georgia, School of Business Administration, Athens, Georgia 30601

While restrictive zoning has frequently been advanced as a flood control and urban water management measure particularly in the case of coastal areas, such measures as restrictive zoning have not been widely adopted.

ize a land-use simulation model being developed by the University of Georgia for the Georgia Department of Transportation to simulate land use pattern futures for various restrictive zoning policies. The alternative simulated future will then be compared to determine (1) the success of the zoning in achieving its desired goals, (2) the effect of the zoning on the total economy of the community, (3) the effect of the zoning on the distribution of economic welfare among the various regions of the state, and (4) the effects of the zoning on the environment. The study is to be coordinated with studies at other cooperating universities as part of a package evaluating social goals with respect to preserving open space and natural areas. The role of this study is to provide insights into the consequences of the open space preservation policies suggested as appropriate by the companion studies.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0238, SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS

L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332

Flood damages can be reduced by structural measures designed to contain runoff, nonstructural measures designed to reduce human activity in hazard areas, and land treatment measures designed to reduce runoff. Formulation of a combination of measures appropriate for a given situation should consider: 1) economics, 2) the hydrologic consequences of land use patterns, 3) the perceptions and desires of the affected public, 4) the interactions of the well-being of urban society with natural areas, and 5) the ecological values of the flood plain.

The principal investigator's previous exploration of the first four factors has produced a computer program for determining a least cost solution and methodologies and findings related to dealing with hydrologic factors, social forces leading to flood plain settlement, and effects of access to open land on urban well-being and local government. This research aids a group of ecologists.

The research procedure is to 1) consolidate the five methodologies into a form for easy explanation to and application by planners, 2) select four flood hazard case studies for applying the methodologies, 3) present the package to a graduate class containing experienced planners to study the workability and the results of the technique, and 4) integrate the total information obtained into a comprehensive flood planning package for general use.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Res.

#### 6.0239, THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY

L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332

Abstract: Various levels of decision making affecting settlement in flood plains are analyzed from the viewpoints of individuals seeking a residential location, individuals engaged in land development and construction activity, and individuals charged with forming and government. A concep-

Pub. Oct. 71: 309p., NTIS No. PB-206 424: PC \$6.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0240, THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT

L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332

Abstract: Historical development in the Peachtree Creek flood plain and watershed, metropolitan Atlanta, Georgia, and the reactions of planning officials, changes in water quality and land values are analyzed to ascertain the implications of historical experience for improved flood plain management policy. The report presents the historical sequences and causes and the role of governing officials in influencing development in the watershed from the time of earliest settlement, stressing flood plain development; analysis of the relative values of undeveloped lots on and off the flood plain and discusses the extent to which observed differences are caused by expected flood damages as opposed to differences in other residential choice factors; changes in stream water quality associated with urbanization and assessment of the magnitude of the problem created by storm water washing of urban areas, even if no sanitary sewer effluent is discharged directly into the stream.

Pub. Oct. 71: 93p., NTIS No. PB-206 427: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0241, TRAVEL TIME OF GEORGIA STREAMS

A.M. LUMB, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332

Abstract: Estimates of the time of travel of flow in natural streams are important to the hydrograph routine necessary for the planning and operation of flood control systems and to the routing of pollution movement needed for water management programs. Such estimates are particularly important when reacting to accidental spills that can contaminate downstream water supplies. This study develops, through multiple regression analysis of data on Georgia streams, prediction equations more accurate than current office approximations and less costly than tracer or other field studies. From the limited data available, it appears the equation for average velocity tends to underestimate travel times at high flows and over-estimate travel times at low flows. Only data for the north central and northwestern portions of Georgia were available for comparison.

Pub. Sep. 73: 90p., NTIS No. PB-224 848/2: PC \$6.50 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0242, THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED

J.R. WALLACE, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332

Abstract: Historical changes in the pattern of land use and the effect of these changes on floods along Peachtree and Nancy Creeks, streams flowing through metropolitan Atlanta, Georgia, are analyzed and discussed. Land-use patterns in the watershed were determined at several points in time. Rainfall

and significantly increased the peak runoff from summer storms.

Pub. Oct. 71: 79p., NTIS No. PB-206 426: PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0243, A PROGRAM FOR METROPOLITAN WATER MANAGEMENT

G.E. WILLEKE, Georgia Inst. of Technology, Environmental Resources Center, Atlanta, Georgia 30332

Abstract: Study objectives were to describe metropolitan water management; determine strengths and weaknesses of institutional arrangements; evaluate means of financing water programs; and suggest ways management could be improved. Field studies were done in Macon, Georgia, Lansing, Michigan, Charleston, Columbia, and Greenville, South Carolina. Emphasis was placed on differences among areas in terms of physical, economic, and political context. Depth interviewing was employed for 190 public officials, citizen groups, and general informants. Water management included water supply, wastewater management, storm drainage, flood hazard reduction, and recreation. Water management is treated as a social process. Roles of participants, nature of decisions and nondecisions, actions and inactions, functional priorities, intergovernmental relations, management style, and public participation are discussed.

Pub. Jul. 72: 231p., NTIS No. PB-212 717: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0244, ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA

H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey, Atlanta, Georgia 30309

Urbanization produces vast changes in the flood runoff characteristics of streams; therefore, natural (rural) basin flood-frequency relations are not applicable to urban streams. Few hydrologic data observations currently are available for streams in metropolitan areas. Flood-frequency data are needed in the design of drainage structures and in the regulation of developments in the flood plain. Water quality and sediment data for urban streams are needed for the design of pollution control facilities and for planning of low environmental impact developments.

To provide a method for estimating the magnitude and frequency of floods for streams in the Atlanta, Georgia, metropolitan area. Also, to collect information on floods as they occur on streams in the area to provide stages at specific locations and to locate chronic or potential flood problems. To provide water quality and sediment data for utilization in minimizing construction pollution, proper design of pollution control facilities, and control and regulation of polluters.

About 30 urban basins in the Atlanta metropolitan area will be selected to represent a range in drainage area (1 to 15 sq mi), imperviousness, storm sewers samples of urban, suburban and industrial developments, as well as a range of topographic variables. When sufficient data (about 30 significant runoff events) are available at a site, USGS rainfall-runoff model will be calibrated and used to synthesize flood peak data. When sufficient peak data, representing varying degrees of urbanization, have been synthesized a regionalized urban flood-frequency relationship can be developed.

properties of culvert and channel of proposed sites. Approximate drainage areas, channel slopes, and types of land use have been determined to assure an adequate range of these parameters when selecting gage sites. (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0245, WATER RESOURCES OF MIDDLE GEORGIA

UNKNOWN, Middle Georgia Area Plan. Com., Macon, Georgia

Abstract: The report includes: an inventory and analysis of the area's water resources; estimates of future requirements for beneficial use; guidelines for the preparation of master plans for storm drainage and flood control by local governments; and a program for flood plain management. A glossary of terms and bibliography of reference materials used in preparation of the report is provided.

Pub. Mar. 72: 261p., NTIS No. PB-211 286: PC \$15.25 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0246, SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III)

C.M. FULLERTON, Univ. of Hawaii, Cloud Physics Observatory, Hilo, Hawaii 96720

The basic questions being addressed are as follows: a. How long do particular shower cells of varying intensities last, and how much total rain do they produce? b. How does the rain vary in space and in time? c. How are the movements of smaller scale features within the shower related to the movement of the shower as a whole? d. How might the results to be obtained related to infiltration and runoff, lead to criteria for water catchment locations and flood predictions?

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Res.

#### 6.0247, HYDROLOGIC RELATIONS IN HAWAII

D. JAY, U.S. Army, Pacific Ocean Division, Honolulu, Hawaii 96813

Purpose of study/investigation: To obtain data on rainfall-runoff relations in Hawaii for establishing criteria for hydrologic design of flood-control projects and for flood-plain information studies.

Approach or plan: The investigation involves collection of rainfall and streamflow data. The basic data are analyzed to derive general rainfall-runoff relations which are incorporated into hydrologic design criteria.

Progress to date: Project Bulletin No. 1, printed 30 November 1964, shows the preliminary results of studies in the Kulihi Basin. Collection of rainfall and streamflow data has been completed. Correlation of physical characteristics of the drainage areas to their effects on runoff, and development of unit hydrographs have not been completed. Funds have not been available since FY 69 to complete this study due to budgetary limitations.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0248, FLOOD INUNDATION STUDY - WISCONSIN

R.S. GRANT, U.S. Dept. of the Interior, Geological Survey, Honolulu, Hawaii 96814

## MAJOR DISASTER TYPES

The primary objective of this project is to determine inundation limits for flood discharges of sufficient magnitude so that state and local governmental agencies may formulate meaningful zoning ordinances.

Flood inundation studies will be conducted for specific areas as designated by the cooperating agency. The priority of areas is to be determined by potential and/or existing flood hazard and the availability of topographic and hydrologic data. Actual field surveys will be made to establish a sufficient number of channel characteristics to enable computations of water surface profiles. The inundation limits will be presented on a series of enlarged areal photographs. A brief text will be included.

Step-backwater analyses agreed well with historic flood data available.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0249, SPECIAL FLOOD DATA COLLECTION, HAWAII**  
*R. LEE, U.S. Dept. of the Interior, Geological Survey, Honolulu, Hawaii 96814*

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Hawaii.

**Purpose:** To collect flood information at a wide variety of sites that will be useful in the design and location of structures on or near streams and allow definition of the magnitude and frequency of floods on a regional basis.

**Methods:** Ninety-two crest-stage gaging stations are being operated to supplement peak-discharge records from the regular stream-gaging network. The records of peaks will be analyzed by multiple regression methods to determine regional flood frequency and magnitude relations.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0250, FLOOD PLAIN MAPPING IN HAWAII**  
*R.H. NAKAHARA, U.S. Dept. of the Interior, Geological Survey, Honolulu, Hawaii 96814*

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Hawaii.

**Purpose:** To delineate flood inundation areas throughout the State and thus aid responsible agencies in the development of flood plain zoning.

**Methods:** Records of peak discharges from the gaging station network will be used to determine the magnitude and frequency of floods. Field surveys of inundated areas will be made and transferred to enlarged topographic maps (scale 1:12,000) to delineate the inundated areas. Historical data and information from local residents will be compiled.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0251, SPECIAL FLOOD DATA COLLECTION - HAWAII**  
*UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Honolulu, Hawaii 96814*

The rapid growth in population in Hawaii has resulted in increasing urbanization. Progressive encroachment on flood plains has caused many zoning and engineering problems.

The objective of this project is to collect flood information at a wide variety of sites that will be useful in the design and location of structures on or near streams. In the final stage, the data will be used to determine flood frequency relations and to develop flood hazard maps.

Annual flood report completed. Preliminary network made. Efforts made to improve quality of data.

Continue network operation, changes to be made to work evaluation. Update frequency curves and regression relations. Incorporate regression relations into flood report.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0252, HAWAII ENVIRONMENTAL SIMULATION MODEL**

*D.C. COX, Univ. of Hawaii, School of Arts, Honolulu, Hawaii 96822*

The major objectives of the Hawaii Environmental Simulation Laboratory for the project period are: to develop a model to simulate the environmental effects of alternative decisions with respect to the interrelated aspects of land use, public facilities, flooding, and water quality for the Kaneohe region of Oahu; to develop a means interactively with State and county agencies to use them with representatives of these agencies and special interest groups in the simulation of future environmental consequences based on various possible alternative decisions. The results of these simulations will be presented to official planning bodies. HESL will also provide assistance to the development of means for simulation with respect to water pollution and the ecology of Kaneohe Bay.

SUPPORTED BY U.S. Natl. Science Foundation

**6.0253, NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973**

*H.W. LEE, State Planning & Com. Aff. Agy., Boise, Idaho 83720*

This report includes an analysis of the natural disasters to each community within Latah County. Included in the analysis are such items as natural disasters which have occurred, the communities' ability to meet and cope with disasters, possible threats, and sections of the county most susceptible to each type of natural disaster.

A roster of the organizational structure of each community is included along with a listing of contact persons for each community. These listings will become part of the disaster mitigation process.

Several flood plain delineation maps are included which were developed by the Corps of Engineers. These maps show approximate limits of the 100-year flood for the major rivers along which the major flood damage occurs in Latah County.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0254, MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO**

*C.A. THOMAS, U.S. Dept. of the Interior, Geological Survey, Boise, Idaho 83702*

**Abstract:** A method which relates basin characteristics to peak flow characteristics is presented for determining the magnitude and frequency of floods on streams within areas between 0.5 and 200 square miles. Regression equations for each of eight regions are presented for determining flood frequency relations. The results of the study are presented in the form of a series of maps showing the distribution of flood frequency relations for each of the eight regions.

Pub. Apr. 73: 97p., NTIS No. PB-222 409/5: PC \$7.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0255, DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS

J.D. CAMP, U.S. Dept. of the Interior, Geological Survey, Champaign, Illinois 61820

Fairly reliable procedures have been developed for estimating the magnitude of peak discharges corresponding to various frequencies of flow for streams throughout Illinois. Techniques also are available that permit reasonably accurate determinations of depths for given magnitudes of discharge in a stream channel. Those techniques, based on hydraulic principles, require field surveys to determine channel characteristics and, in general, they must be applied by someone trained and experienced in hydraulics. Often the uses for which flood-depth information is needed do not justify the precision nor the effort required to apply those techniques. For example, the nationwide project to delineate flood-prone areas (House Document 465) would be facilitated if a simple procedure were available for making, rather quickly, estimates of flood depths along ungaged streams.

To develop techniques and procedures that can be used for estimating depth-frequency relationships for streams throughout Illinois. Those techniques and procedures are to be simplified so that they will be useful to people with non-technical backgrounds, such as local planners, real-estate appraisers, etc.

The recently completed report on magnitude and frequency of flood discharges for Illinois streams will be used with stream-flow records for approximately 300 sites in the State to define flood discharges for selected frequencies ranging from the 2- to the 100-year recurrence interval. Stage-discharge relationships available for those sites will be used to determine corresponding depths of flow. Depths of flows for various frequencies will be correlated, by multiple-regression techniques, with stream channel and basin characteristics as independent parameters, to define regional equations that relate depths to parameters that can be measured or estimated from maps.

Initiated manual compilation of data and correlated depths of flows for various frequencies by multiple-regression techniques.

Continue analyses and define regional equations, prepare open-file report, and distribute same to interested parties.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0256, FLOOD FREQUENCY STUDY ILLINOIS

J.M. CARNS, U.S. Dept. of the Interior, Geological Survey, Champaign, Illinois 61820

The magnitude and probable frequency of recurrence of floods are primary factors in the design of structures within the flood plains of streams in the entire state of Illinois. A report entitled 'Floods in Illinois: Magnitude and Frequency' (Mitchell, 1954) was based on flood records through 1950.

An update of the station data of the 1954 report will

A study will be made to identify and correlate the that best describe the flood-producing characteristics of streams. Techniques will show how floods of various recurrence intervals, on basis of the independent parameters of drainage area, basic lag time, and geographic location, can be estimated for any location. The present analysis includes records collected after 1954 on many stream gauges. 10 sq. mi. Additional parameters will improve the quality of estimates of floods at ungaged sites.

Report published by cooperator December 1973. Ready for printer on June 30, 1972; publication withheld until printing funds were released by state of Illinois. Distribution of the report was made in January 1974.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0257, COMMUNITY GOALS - MANAGEMENT OF LAND RESOURCES - AN APPROACH TO FLOOD MANAGEMENT

J.R. SHEAFFER, Univ. of Chicago, Center for Urban Planning, Chicago, Illinois 60637

Abstract: The publication presents a methodology for analyzing first-round local effects related to the changing availability of water for supply purposes or recreation. It develops estimates of demand for reservoir recreation, estimates the change in structural unemployment resulting from changes in output. It evaluates the difference between regional multiplier values and proposes a refinement of multiplier estimates; it integrates the various research findings and presents a case for a selected strategy for those national income benefits to water resource management in excess of direct output valued in terms of willingness to pay.

Pub. May 70: 257p., NTIS No. AD-707 461: HC \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Army

# 6.0258, NATURAL CAPABILITIES - THE CREEK SERIES, MACON COUNTY, ILLINOIS

UNKNOWN, Macon Co. Regional Plan Comm., Illinois

Abstract: The study analyses the natural capabilities of Creek Township in terms of suitability for agriculture, urban development, countryside development, and water systems. It considers relationships of sociological structures, ground water availability, characteristics, stream pollution and potential development for human and natural needs. The summary map showing suitability of overall land use for various types of development.

Pub. Jan. 70: 95p., NTIS No. PB-194 677: HC \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

# 6.0259, RESEARCH INITIATION - A MULTIVARIATE STOCHASTIC MODEL FOR FLOOD ZONING

model. Goodness-of-fit tests, such as the chi-square and Kolmogorov-Smirnov, will be used to quantitatively evaluate the appropriateness of fitted models. Rainfall processes will be combined with various rainfall-runoff models in order to study the effect of selected geographical and man-made features on dangerous runoff levels. It will be the intent to study levels that are harmful in their long term ecological effects on the environment as well as those levels producing immediate damage. The floods themselves (although not the individual storms) will be well modeled as occurring in a Poisson or Markov manner. Included will be the gathering of data on flood damage in an effort to provide a realistic cost function.

SUPPORTED BY U.S. Natl. Science Foundation

#### 6.0260, A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS

UNKNOWN, Stephenson Co. Planning Comm., Freeport, Illinois 61032

**Abstract:** The Stephenson County Comprehensive Plan is an integration of the plans of the local communities based upon the broad framework of a plan for the entire county including environmental factors, land utilization, highways, drainage, community facilities, recreation, and housing. Based upon an analysis of the data, the comprehensive plan includes recommendations for land use, thoroughfares, community facilities, public buildings and public utilities. The plan lists the following opportunities for development in Stephenson County: redevelopment of Freeport, the central city; community and neighborhood improvement; development of Highland Junior College; industrial development; boating and recreation of the Pecatonica River; expansion of Lake Lu-Aqua-Nu State Park; development and relocation of U.S. Route 20; development of a major park on the Rock Run Creek; and development of vacation housing.

Pub. Jul. 70: 341p., NTIS No. PB-193 922: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0261, FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS

A.W. NOEHRE, U.S. Dept. of the Interior, Geological Survey, Oak Park, Illinois 60303

**This research** is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Illinois and the Northeastern Illinois Planning Commission.

**Purpose:** To prepare inundation maps for the Northeastern Illinois Metropolitan area, covering sixty-two 7 1/2-minute quadrangles.

**Methods:** Records will be obtained from an extensive crest-stage gage network, of which 69 sites will be rated for discharge in the 19 quadrangles remaining to be mapped. These records and previously established data collection points will be used to define flood profiles, inundation boundaries, and flood-frequency relationships. Inundation maps will be superimposed on topographic quadrangles and published as Hydrologic Atlases.

SUPPORTED BY U.S. Dept. of Interior, Geological Survey,

resource activities involving State programs or developmental responsibilities. State guidelines for administrative evaluation and for expediting specific proposals are defined. These administrative tools are designed to speed accurate evaluation and processing of both State and Federal development activities. Coordinated guidelines and a system of priorities are presented to facilitate the administration of Federal or State financial assistance to local communities for each of the water resource related programs.

Pub. May 70: 215p., NTIS No. PB-198 105: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0263, STREAMFLOW VARIABILITY - ILLINOIS

K.P. SINGH, State Water Survey, Urbana, Illinois 61801

**Basic research** into the inherent variability of streamflow is being pursued. Understanding the variability of streamflow provides fundamental knowledge which will be useful in processing Illinois streamflow to provide answers to many questions in areas of water supply direct from streams, drainage duration of low flows and high flows, zoning of flood plain land, and floods.

**Investigation** of baseflow recessions, recharge, stream entrenchment, evapotranspiration, etc., have improved the understanding of low flow variability. Streamflow variability over the entire range of flows has been analyzed in terms of flow duration of 120 streams in Illinois. It shows the importance of physiography in delineating hydrologically similar divisions and the effect of basin size on flow variability within a given division. A versatile transform has been developed for statistically analyzing monthly runoffs. Research is being extended for seasonal low flows and daily-flow variability parameters for a month.

SUPPORTED BY Illinois State Government - Springfield

#### 6.0264, EVALUATION OF FLOOD RISKS

K.T. CHOW, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

**Flood data** at ten stream gaging stations on rivers in Illinois are analyzed for their characteristics of flood generation on the basis of the theory of nonparametric probability distributions. Once the probability model for flood occurrences is formulated, flood sequences are generated by the Monte Carlo method and then compared with historical flood sequences.

SUPPORTED BY University of Illinois

#### 6.0265, RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS

B.A. JONES, Univ. of Illinois, Agricultural Experiment Sta., Urbana, Illinois 61801 (ILLU-10-0312)

**Objective:** Determine the frequencies of peak rates and volumes of runoff from agricultural watersheds of 25 to 1000 acres located on permeable soils with mild slopes in Central Illinois. Test and evaluate the usefulness of mathematical hydrologic models to small agricultural watersheds with mild topography. Provide benchmark watersheds in Central Illinois for the study of the quality of runoff water.

6.0266.

**Progress** All of the rainfall and all but one station of runoff data from the Allerton watersheds for 1971 have been reduced, tabulated and assembled for analysis. The 1971 wind and past temperature - humidity data are continuing to be manually transcribed as time permits. Although the 1972 rainfall-runoff data has not been fully tabulated, this year's data provides much needed periods of above normal rainfall. August rainfall was nearly twice the normal for the area and included two large volume rainfall periods. September rainfall was more than twice the normal and included five large rainfall periods. Three of these rainfall periods were in an eight-day period. A major effort was devoted to the replacement of the 30-year old instruments which were deteriorating rapidly. Four recording rain gages and one hygrothermograph were replaced with similar new equipment. The anemometer was also replaced with an event recorder added so that continuous wind speed records may now be obtained. Previously only total wind distance was recorded at each recording period, usually one week.

**SUPPORTED BY** U.S. Dept. of Agriculture - C.S.R.S.

**6.0266. AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO**

**H.M. KEITH**, Univ. of Illinois, Water Resources Center, Urbana, Illinois 61801

**Abstract** The objectives were to determine why state statutes and local zoning ordinances are not effectively used in floodplain management, to determine alternative methods available and to analyze the alternatives to determine their suitability for management purposes. The objectives were only partly achieved within the time frame of the study. A repository of enabling legislation, information and inventory reports and ordinances relating to floodplains has been established for Illinois, Indiana, Iowa, Missouri and Ohio. This can be used for monitoring and evaluating changes in regulations and management procedures. An analysis of the floodplain regulations in these five states is presented.

**Pub. Apr. 73: 29p., NTIS No. PB-219 234/2: PC \$3.00 MF \$0.95.**

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

**6.0267. HYDROLOGIC MODELS OF THE GREAT LAKES**

**D.D. MEREDITH**, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

The objective of the proposed research is to develop deterministic and stochastic hydrologic models of the Great Lakes in order to better understand the Great Lakes as a system and to provide information for planning and management of the Great Lakes water resources. This objective is to be satisfied by (1) developing a deterministic simulation model on a monthly basis in order to reproduce the historical level of the Great Lakes using the components of the hydrologic cycle; namely, precipitation, evaporation, surface runoff and ground water flow; (2) performing a sensitivity analysis to determine the effects of changes in these components on the Great Lakes level; (3) developing stochastic models for each of the individual components of the hydrologic system; (4) combining these individual models in order to study the stochastic behavior of the Great Lakes system; and (5) comparing the results of the models with observed data.

**UNKNOWN**, Clyde E. Williams & Assoc. Inc., Indianapolis, Indiana

**Abstract:** Standards and maps are presented for zoning an unincorporated area of Knox County, Indiana.

**Pub. Dec. 71: 150p., NTIS No. PB-206 088: PC \$5.00 MF \$0.95.**

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

**6.0269. HYDRAULICS OF SHALLOW FLOWS OVER STABLE ERODED SAND SURFACES DEFINED BY AREA SPECTRA**

**J.R. BURNEY**, Purdue University, Water Resources Center, Lafayette, Indiana 47907

**Abstract:** Estimation of the hydraulic response of a land area to shallow overland flow is of major concern in the flood control and dependent structures in small agricultural watersheds. The problem concerns the necessity for the appropriate depth-discharge relationship, based on observation of the physical land surface form. The study develops, tests and evaluates instrumentation for the physical configuration of a natural, fallow land surface. It includes both grain and form effects, and attempts to provide the information to the hydraulic response of the surface.

**Pub. Feb. 73: 141p., NTIS No. PB-221 347/8: PC \$5.00 MF \$1.45.**

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

**6.0270. THE EFFECT OF URBANIZATION ON THE HYDROLOGY OF WATERSHEDS - INDIANA**

**J.W. DELLEUR**, Purdue University, School of Engineering, Lafayette, Indiana 47907

One of the main objectives of the research is to develop mathematical models which would characterize the effect of urbanization on runoff. To achieve this purpose, data from watersheds of varying degrees of urbanization in Lafayette, Indiana, as well as from other watersheds in Indiana and elsewhere will be used. Presently, data is being collected from two watersheds in West Lafayette, Indiana, the Ross Ade Drain Watershed (362 acres) and the Purdue Swine Farm Watershed (470 acres). Each watershed is subdivided into an upper and a lower watershed and runoff are also collected for upper watershed. Data collection from these watersheds will continue as part of the proposed study.

Data analysis will be carried out by means of conceptual mathematical models simulating watersheds of varying degrees of urbanization. Linear and nonlinear mathematical models will be used to investigate the effect of urbanization on runoff. After suitable models are selected, it is intended to develop a design manual based on the results of the study for the use of practicing engineers.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

**6.0271. WABASH RIVER SYSTEMS MODELS FOR FLOOD CONTROL, PROJECT MANAGEMENT, PLANNING AND EVALUATION**

**G.H. TOEBES**, Purdue University, School of Civil Engineering, Lafayette, Indiana 47907

The research concerns the use of simulation models to

formation to potential users. Indicated will be how to extend the simulation model to encompass the entire Wabash River for the purpose of day to day water resource management in the Wabash Basin.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Res.

#### 6.0272, ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE

J.R. BARNARD, Iowa State University, Water Resources Research Inst., Ames, Iowa 50010

Abstract: The extent of agricultural land use change on the floodplain of the Iowa River as a result of the building of the Coralville Dam is examined. The dollar values of benefits from land use change are estimated and compared to the original project study estimates prepared by the Corps of Engineers. The study also analyzes the factors affecting land use change.

Pub. Dec. 71: 13p., NTIS No. PB-208 610: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0273, THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA

J.S. GARDNER, Iowa State University, Water Resources Research Inst., Ames, Iowa 50010

Abstract: Human ecological impacts of the Coralville Dam and Reservoir, a flood control structure on the Iowa River, Iowa are described. Impacts include agricultural and urban land use changes, recreation participation growth, changes in stream hydrology, erosion, debris and problems associated with prolonged, controlled outflows from the dam and high water levels in the reservoir, and a number of indirect effects of these changes. Prolonged and high outflows from the dam have produced downstream flooding on agricultural land. Resulting conflicts between farmers and the Corps of Engineers over the flood control structure and its operation have lessened its beneficial image at the local level. The research indicates careful attention should be directed to scale of impact, dynamics of impact, zone or location of impact, socio-economic distribution of impact and components of impact, in environmental and human ecological analyses.

Pub. Dec. 73: 270p., NTIS No. PB-228 644/1: PC \$16.50 MF \$0.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0274, FLOOD PROFILES OF IOWA STREAMS

O.G. LARA, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

Information is needed on flood peaks and profiles for the economic and safe location and design of bridges and other structures on or over streams and their flood plains. Defining the limits of flood inundation and establishing encroachment limits on flood plains are companion problems needing the same kind of information.

To define the profiles of at least one major flood of record and of floods of selected frequency-usually the 25- and 50-year floods-along streams draining 100 or more square miles.

High-water marks are set along the streams after major floods and later tied to MSL datum. Gaging-station records and supplemental discharge measurements are used to define peak discharges along the streams. Stage-discharge relations at strategic points are defined by step-backwater computations.

and tied to local datum for outstanding flood of September 1972 in Nishnabotna R. basin. Field data on moderate flood in Floyd River basin was obtained. Record flood of April 1973 in lower Skunk R. basin was profiled and infrared and multi-spectral aerial photography obtained. Leveling work continued in Skunk R. basin. Work was done on updating and revising Rock River profile report.

Complete profile work in lower Skunk R. basin for inclusion in Mississippi River flood report. Continue leveling work in rest of Skunk basin and begin level work to tie high-water marks to sea level datum in Nishnabotna River basin. Publish updated Rock River report.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0275, FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA

O.G. LARA, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

Spillover of development from the Cedar Rapids-Marion Metropolitan area into the county posed potential problems in flood-prone areas along small streams in Linn County.

To provide flood information useful to regulatory agencies in guiding development of flood-prone lands. A supplementary objective is to provide data useful for planning and design of new highways and bridges and rehabilitation of existing inadequate facilities.

High-water marks are set after occurrence of significant floods and are tied to MSL datum by levels. These data together with valley cross-sections and step-backwater computations are used to produce flood profiles and definition of inundated areas. Site studies are made at the request of the cooperator.

Completed surveying and leveling work for Big Creek.

Prepare special reports on selected bridge-sites as requested by the cooperator. Prepare on Big Creek, if actual flood-profile data is collected.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0276, FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA

O.G. LARA, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

Expanding urban growth posed potential for problems relating to encroachment on flood plains of small streams in, and near the city of Cedar Rapids.

Obtain flood information on small streams in and near the city to aid State and local agencies in flood-plain management.

Obtain information on the discharge and profiles of significant floods that occur. Using standard methods of step-backwater computation, prepare profiles for floods of selected frequency and for predetermined degrees of flood-plain encroachment. Studies to be pursued each year are determined in conference with cooperator.

Continued operation of gage on Vinton Ditch. Obtained section properties for use in computer program analyzing effect of on-channel reservoirs on flood flows. Computer program results relayed to city through conference with city engineering staff.

Continue Vinton Ditch record collection and study. Assemble and analyze all flood information on Vinton Ditch for final report to city.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey



O.G. LARA, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

Data concerning flood peaks and flood profiles are needed to answer fundamental questions on flood-plain management, and development of city flood-plain zoning ordinance.

To supply floodway information and define the profiles of floods of selected frequency.

Using standard methods of step-backwater computation, prepare profiles for floods of selected frequency and predetermined degrees of flood-plain encroachment.

Work completed and report prepared on flood-flow study defining flood profiles and inundation limits along University Branch, Dry Run Creek, in city of Cedar Falls.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0278, FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA

O.G. LARA, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

Action and regulatory agencies, such as the Iowa natural resources council, are confronted with problems arising from inconsistencies in flood-frequency results reported by various agencies. The water resources council (1967) has recommended the Log-Pearson Type III method for general use and, in line with this recommendation, the cooperator wished to have a re-analysis of all Iowa flood records using the recommended method.

A primary objective was to up-date all Iowa flood records, analyze them using the Log-Pearson type III method as a base, and prepare a user manual for application of the method developed. A secondary objective was to carry on concurrent analyses of flood data using the index-flood and log-normal methods and to compare the results obtained by the various methods.

All station data for Iowa streams will be analyzed using the Log-Pearson III method. Regional relationships will be developed using correlation with physical and climatic parameters. Upon completion of this phase a user manual will be prepared for the practitioner. A second report, a technical report, which will contain comparative data on the methods studied and technical discussion on sampling procedures, errors, correlations, etc. Both reports to be published by cooperator.

A user manual on computing magnitude-frequency relations for Iowa streams was revised as suggested in colleague review and is now being printed through auspices of cooperator. A technical report on flood-frequency studies in Iowa was essentially completed and will be ready for colleague review in a few weeks.

Technical report to be published by cooperator following colleague review. Project will be completed then.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0279, FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA

H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

This research is part of the program of water resources investigations conducted by the U.S. Geological Survey in cooperation with state and local agencies in Iowa.

Methods: Flood-profile data will be obtained in the near future immediately after the occurrence of significant floods or by computation using channel cross sections and other pertinent field data.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0280, FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA

H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey, Iowa City, Iowa 52240

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with state and local agencies in Iowa.

Purpose: To define flood profiles and obtain flood information on several small streams in Linn County that will be useful to local agencies in future development and in formulating and administering zoning regulations.

Methods: Profiles of flood flow and low flow will be obtained and discharge measurements made at a sufficient number of points along the selected streams to define the stage-discharge relations. Flood-frequency data will be computed.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0281, EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS

C.O. GEIGER, U.S. Dept. of the Interior, Geological Survey, Lawrence, Kansas 66044

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with State and local agencies in Kansas.

Purpose: To investigate the relation of changes in land use in urban areas to corresponding changes in high-water discharge characteristics.

Methods: Flood-volume runoff is being defined in seven small basins where degree of urbanization varies from rural and likely to remain rural, through degrees of expanding urbanized areas to completely urbanized. Rainfall at 5 to 15 minute intervals are defined at 6 sites and daily rainfall at about 43 sites. Degree of urbanization is defined in each basin at 3-year intervals.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0282, EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA

D.B. RICHARDS, U.S. Dept. of the Interior, Geological Survey, Lawrence, Kansas 66044

Little is known about the effect of urbanization on the flood discharge in Kansas.

To determine the effect of urbanization on flood discharge in Wichita.

Basins in Wichita, for which the percent of impervious area and area served by storm sewers can be determined, have been instrumented to measure the variables of rainfall and runoff. The change in the shape of unit hydrographs will be used to monitor the effect of increased urbanization. A generalized digital watershed model will be developed.

Started modeling data from three rainfall-runoff recorders in small urbanized basins in East Wichita. Continued to collect sediment samples at one site in a partially urbanized basin currently undergoing construction. Continued to measure moisture conditions in the basins by means of neutron logging.

Continue to operate the gaging stations and analyze the data.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0283, ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY**

UNKNOWN, State Program Dev. Office, Frankfort, Kentucky 40601

**Abstract:** The purpose of this County Zoning Order and City Ordinance is to promote the public health, safety, morals and general welfare by providing for a reasonable, logical and desirable comprehensive system or pattern of land use in the unincorporated area of the county, by preventing the mixing of incompatible land uses, by lessening street congestion, by avoiding undue concentration of population, by preventing erosion of land, by securing safety from fires, floods, and other dangers, by providing adequate light and air, by facilitating the provision of public and private utilities, and, where applicable, by implementing the Land Use Plan and other elements of the county's Comprehensive Plan for future development.

Pub. Dec. 69: 93p., NTIS No. PB-192 700: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0284, ZONING ORDINANCE - PAINTSVILLE, KENTUCKY**

UNKNOWN, State Program Dev. Office, Frankfort, Kentucky 40601

**Abstract:** The revision of the ordinance contains regulations for the control of mobile homes, flood plain zoning and townhouses. These regulations were extracted from information obtained from the Department of Health, Education and Welfare.

Pub. Jan. 71: 60p., NTIS No. PB-201 544: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0285, OPSET - PROGRAM FOR COMPUTERIZED SELECTION OF WATERSHED PARAMETER VALUES FOR THE STANFORD WATERSHED MODEL**

E.Y. LIOU, Univ. of Kentucky, Water Resources Institute, Lexington, Kentucky 40506

**Abstract:** The Stanford Watershed Model uses a hydrologic budget to model the land phase of the hydrologic cycle and thereby simulate streamflow on a continuous basis from climatological data and watershed parameters. Values for key parameters are estimated by trial-and-error. Subjective estimating differences have made it difficult to correlate parameter values with known physical characteristics of the watershed. This study sought to computerize a parameter optimization procedure based on the FORTRAN version of the Stanford Watershed Model known as the Kentucky Watershed Model. The resultant self-calibrating watershed model is named OPSET because it determines an optimum set of parameter values by matching synthesized flows with recorded flows. The first step in program development used sensitivity studies to determine which watershed parameter values are critical in simulating flow and are difficult to measure directly. The second step was to adjust estimates of the

basis, and values best describing watershed characteristics should be averaged from several OPSET-selected one-year-based values.

Pub. 1970: 313p., NTIS No. PB-198 442: PC \$6.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0286, FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY**

A. WAIBY, Bullitt Co. Planning Comm., Shepherdsville, Kentucky 40165

The purpose of this Flood Plan is to provide basic data on flooding in Bullitt County as a background for information and recommendations on floodplain development control measures in light of and relevant to the appropriateness of the National Flood Insurance Program.

The report begins with a description of flood-plains including their land use, and the history of flooding and flood damages. Existing public and semi-public measures to deal with and compensate for flood hazards are then discussed. Based on a description of the National Flood Insurance Program including its benefits and eligibility requirements and the generally recommended development regulations for floodplains, the alternatives available to Bullitt County are outlined.

Pub. May 73: NTIS or Bullitt County Planning Commission.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0287, SMALL STREAMS FLOOD FREQUENCY IN MAINE**

G.S. HAYES, State Highway Commission, Augusta, Maine 04330

**Abstract:** The preliminary report is of the progress made to date on the small (1 to 50 square miles) watershed study in Maine. The findings of the report are limited by short (6 years) runoff records used to derive a formula for peaks of up to the 10-year frequency. The formula uses the following basin characteristics: drainage area, channel slope, channel length, storage, forest cover. The formula is an adaptation of an earlier USGS method which was limited to large watersheds.

Pub. Mar. 71: 11p., NTIS No. DB-204 371: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0288, DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE**

E. KEENE, North Kennebec Reg. Pln. Comm., Waterville, Maine 04901

This project will investigate the data needs necessary to enable rational decision-making with respect to flood plain zoning and proper utilization of riparian lands along the main stem of the Kennebec River in Maine. Recommendations will be made for involving local governments in the decision making and incorporate long term planning for community development as well as non-structural alternatives such as local zoning and the new State level zoning authority.

Certain kinds of data are available, but no comprehensive analysis of availability and need has ever been done. The regional

6.0289.

to measure proposals; and (4) drafting of a proposed management scheme.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

# 6.0289, CLIMATES OF THE STATES - CLIMATE OF NEW YORK

A.B. PACK, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Silver Spring, Maryland 20910

Abstract: The data summary on the climate of New York presents a brief physical description of the state and brief descriptions of its general climatic features, its temperature, precipitation, snowfall, floods, winds and storms, as well as other climatic elements and their relationship to the economy.

Pub. Jun. 72. 31p., NTIS No. COM-72-50990: PC-GPO MF \$0.95

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 6.0290, PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA

J.T. RIEDEL, U.S. Dept. of Commerce, National Weather Service, Silver Spring, Maryland 20910

Abstract: The purpose of this study was to provide estimates of probable maximum precipitation (PMP) and other meteorological criteria needed for determining the combined snowmelt and rain flood for 11 subbasins of the Red River of the North above Pembina, North Dakota and two subbasins of the Souris River above Minot, North Dakota. General estimates of PMP were prepared. From the charts and graphs presented, estimates of PMP may be determined for any selected subbasin in the two river drainages. In the second chapter meteorological summaries are given of the major weather features of the storms most important to setting the level of PMP. Subsequent chapters deal with all-season probable maximum precipitation, seasonal and geographic variations, time and areal distribution, snowmelt criteria, snowpack available for spring melt. Finally a stepwise procedure is given for obtaining PMP and the snowmelt criteria for any subbasin.

Pub. May 73. 81p., NTIS No. COM-73-5069616: PC-GPO MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 6.0291, ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES

J.H. FOSTER, Univ. of Massachusetts, School of Agriculture, Amherst, Massachusetts 01002

Current analysis on which flood control decisions are based is deficient in both economic and legal content. Objectives of this project are: Studies of five different flood control alternatives will include a state of knowledge report, collection of relevant Connecticut River Basin data, legal considerations, and equity impact. Emphasis will be given to intangible costs and benefits. A final step will be to determine an optimum strategy by use of the JAMES computer program with modifications for intangibles.

In addition, the legal sub-project will identify legal implications

# 6.0292, DETERMINATION OF DECISION PROCESSES IN WATER RESOURCE PLANNING DEVELOPMENT - THE CONNECTICUT RIVER BASIN

E.R. KAYNOR, Univ. of Massachusetts, School of Agriculture, Amherst, Massachusetts 01002 (C-4116)

The proposed research project will investigate water planning and development in the Connecticut River Basin. Focus of the project will be on actual procedures rather than on institutional arrangements, laws, authority, and That is, project findings will answer the question 'what decides' rather than 'what agency has authority to decide'. Preliminary research indicates that the answers to these questions differ extensively. Research will be directed at actual action taken and at patterns of influence, rather than the formal system as it was designed to work.

Research will center on five water resource areas of the Basin: Water supply, waste water management, flood control, electric power generation, and water and land-based recreational and environmental enhancement programs. These five areas will be described in terms of present planning and development, and patterns of decision making will be ascertained by a combination of extensive interviews and exhaustive analysis of the written record. The final project report in 1975 will provide a detailed data base for use in redesigning institutional arrangements to provide new analytic probes for use elsewhere in water resource planning and development.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. R.

# 6.0293, LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE CONNECTICUT RIVER FLOOD PLAINS

D. WILKES, Univ. of Massachusetts, Man & His Environment Inst., Amherst, Massachusetts 01002

Identifies legal issues with an impact on permissible flood plains along the Connecticut River and issues the influence calculations of public costs involved in flood management along the River.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. R.

# 6.0294, LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN

D. WILKES, Univ. of Massachusetts, Water Resources Research Ctr., Amherst, Massachusetts 01002

Abstract: Content covers: administrative and legal content; use of econometric models in floodplain management; and problems of reducing vulnerability of floodplains. Measures to show accuracy of the process used to collect data inputs, persuasiveness of sources, and quality of calculator and computer runs.

Pub. Sep. 73: 54p., NTIS No. PB-226 765/6: PC \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

# 6.0295, RE-DRAFT OF SEEKONK ZONING BY-LAW, NOVEMBER 1969

J. BLACKWELL, State Dept. of Community Affairs, Boston, Massachusetts 02202

Abstract: Contents: Authority, purpose, and validity of the

Pub. Jun. 69: 50p., NTIS No. PB-194 552: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

# 6.0296, FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT

C.G. JOHNSON, U.S. Dept. of the Interior, Geological Survey, Boston, Massachusetts 02203

To obtain an adequate measure of streamflow characteristics of small drainage areas, and to analyze the streamflow records for the particular needs of the highway engineer.

The development of a technique for estimating the magnitude and frequency of floods on small drainage areas in Vermont for the use of the highway engineer.

Installation and maintenance of 11 continuous-recording stream gages with recording rain gages plus about 40 crest-stage gages on drainage basins of less than 10 square miles, all located in carefully selected places so as to sample a wide range of physiographic variables. Probably using a multiple-regression analysis.

Discharge data has been collected at 11 continuous-recording streamflow stations plus recording rainfall records in addition to annual peaks at the 40 crest-stage gages. A status report has been prepared.

Continuation of data collection.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0297, FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND

C.G. JOHNSON, U.S. Dept. of the Interior, Geological Survey, Boston, Massachusetts 02203

To obtain an adequate measure of streamflow characteristics of small drainage areas, and to analyze the streamflow records for particular needs of the highway engineer

The development of a technique for estimating the magnitude and frequency of floods on small drainage areas in Rhode Island, for the use of the highway engineer.

Installation and maintenance of 5 continuous-recording stream gages with recording rain gages plus about 15 crest-stage gages on drainage basins of less than 10 square miles, all located in carefully selected places so as to sample a wide range of physiographic variables. Probably using a multiple-regression analysis.

Discharge data has been collected at 10 continuous-recording streamflow stations plus recording rainfall records in addition to annual peaks at the 42 crest-stage gages. A status report has been prepared.

Continuation of data collection.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0298, USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS

F.J. THOMSON, Environmental Res. Inst. Mich., Ann Arbor, Michigan 48107

Abstract: The author has identified the following significant results. Depth mappings for a portion of Lake Michigan and at the Little Bahama Bank test site have been verified by use of navigation charts and on-site visits. A thirteen category recognition map of Yellowstone Park has been prepared. The author has identified the following significant results.

land mapping has been accomplished by slicing of single band and/or ratio processing of two bands for a single observation date. Both analog and digital processing have been used to map the Lake Ontario basin using ERTS-1 data. Operating characteristic curves were developed for the proportion estimation algorithm to determine its performance in the measurement of surface water area. The signal in band MSS-5 was related to sediment content of waters by modelling approach and by relating surface measurements of water to processed ERTS data. Radiance anomalies in ERTS-1 data could be associated with the presence of oil on water in San Francisco Bay, but the anomalies were of the same order as those caused by variations in sediment concentration and tidal flushing.

Pub. Jan. 74: 80p., NTIS No. E74-10301: PC \$6.00 MF \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

# 6.0299, PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN

E.F. BRATER, Univ. of Michigan, School of Engineering, Ann Arbor, Michigan 48106

Abstract: The report is divided into two parts: Part I provides a description of the research and detailed information on the results and application; and Part II gives the practical design curves. All known methods of predicting floods from precipitation were investigated and the infiltration capacity-unit hydrograph procedure was selected of this study. Data of rainfall, snow melt, and flood runoff from 58 drainage basins varying in size from 0.02 to 734 square miles were analyzed. The infiltration values were derived from 16 drainage basins in Southeastern Michigan. The shape of the unit hydrograph was found to depend on the area of the drainage basin and the degree of urbanization which was represented by the population density.

Pub. Aug. 71: 56p., NTIS No. PB-214 286/7: PC \$3.00 MF \$0.95.

SUPPORTED BY No Formal Support Reported

# 6.0300, AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN

A.R. HOPEMAN, Univ. of Minnesota, Water Resources Research Ctr., Minneapolis, Minnesota 55414

Abstract: Incidence of flood costs analysis provides justification for the imposition of land-use restrictions in flood plains in Minnesota. The analysis indicates that governmental units were the ultimate bearers of nearly half the flood costs in the Minnesota River Basin in the 1965 and 1969 floods. Government units have a substantial, justifiable interest in keeping flood costs down. Flood damage potential will continue to rise over time unless land use controls are instituted. Moreover, government costs are likely to make up an even larger proportion of flood costs in the future, with the advent of Federal flood insurance and an expanded Federal role in the provision of disaster relief. Therefore, thorough and vigorous enforcement of the 1969 Flood Plain Management Act is recommended. In areas where neither evacuation nor structural protection is economically feasible, land-use restrictions alone will have to suffice to curtail flood losses. The beneficiaries of structural flood control works ought to be assessed for a fair share of the costs of such works. This policy is not so crucial for existing flood plain developments, but is important for areas where new developments are proposed.

### 6.0301, FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS

A.F. PABST, Univ. of Minnesota, St. Anthony Falls Hydrol. Lab., Minneapolis, Minnesota 55414

**Abstract:** The objective of this study is the development of analytical procedures and the correlation of hydrologic data to aid in the prediction and control of spring floods in large Upper Midwest watersheds. The study is divided into three phases. The present work (Phase I) has involved (1) the assembly of meteorological and hydrological data concerning past spring floods and new data pertaining to floods during the contract period and (2) procurement and preliminary evaluation of selected mathematical models of watersheds. In future work under phases II and III the data will be subjected to further analysis using available mathematical models, modifications of such models, and new models to assist in synthesizing continuous runoff records.

Pub. Jun. 72: 63p., NTIS No. PB-214 091/1: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

### 6.0302, THE EFFECTIVENESS OF FLOOD CONTROL STRUCTURE OF THE LOWER MINNESOTA RIVER WATERSHED DISTRICT

UNKNOWN, Lower Minn. Riv. Wtrshd. Dist, Savage, Minnesota 55378

**Abstract:** Flood protective structures in the Lower Minnesota River Watershed District, properly planned and constructed, are economical in providing protection against potential floods from the Minnesota River only for existing installations. New construction in the flood plain should include flood protection by proper location of structures as an integral part of the original design. In most cases, capital improvements should be made above the flood plain and far enough away from the main channel of the Minnesota River so as not to unduly restrict flood flows. Dikes, bulkheads, sandbagging, dams, and other structures would not be necessary if the flood plain were developed according to sound flood plain management principles. There is no economic necessity for flood protective structures on agricultural lands even though the land is flooded on an average of once a year. Agricultural use of the flood plain does not restrict high flows and is, therefore, a good use of the flood plain. Low cost flood plain management is the most economical means of reducing and eliminating both losses and the need for further protection.

Pub. Jul. 70: 244p., NTIS No. PB-196 114: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

### 6.0303, WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA

R.W. MACLAY, U.S. Dept. of the Interior, Geological Survey, St. Paul, Minnesota 55414

**Abstract:** Water problems in the Red River of the North basin in Minnesota include flooding, pollution, and water shortages. In the morainal area, problems generally are absent; but in the flat plain of former Glacial Lake Agassiz, they can be severe. About 5.1 million acre-feet of water is perennially available. Average annual flow in streams tributary

northwest part of the basin. Regionally, ground water moves westward from morainal area to lake plain or Red River. Locally, ground water in the morainal area moves from high areas to adjacent lowlands.

Pub. Nov. 72: 141p., NTIS No. PB-218 965/2: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 6.0304, FLOOD PLAIN STUDIES--MINNESOTA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, St. Paul, Minnesota 55414

Recurrent flooding of Minnesota streams is causing ever increasing damage to property and loss to commerce and industry. Recognizing this problem, the Legislature enacted the Flood Plain Management Act of 1969. This Act provides for a flood-plain management program to guide development of the flood plains in a manner to reduce flood damage and require local governmental units to adopt, enforce, and administer sound flood plain management ordinances when sufficient technical information is available.

Provide flood-plain information for designated reaches of streams and municipalities in a form suitable for users to establish flood-plain management measures. It will furnish a basis for the state to coordinate and evaluate the effects of the flood-plain management activities of communities in the state. Data in the forms of flood profiles, flood frequency analyses and strip maps showing the areas inundated by the 100-year flood will be prepared. Floodways designated by the state and local interests will be evaluated by the step-backwater method. Reports on significant reaches of major rivers will be assembled for state publication.

Field surveys or photogrammetry techniques will be used for obtaining valley cross-sections in urban areas. Digital computer models will be constructed using the step-backwater techniques to develop profiles of the 100-year floods. The models will be tested against available historic flood profiles and used to evaluate the effect of proposed flood plain encroachments. Profiles of the regional (100-year flood) will be devised for extended reaches of streams in predominantly rural areas based on historical floods where such data are available.

Detailed flood-plain studies for 8 communities were released to the open-file. Flood-frequency profiles were developed for the lower St. Croix River which will be published jointly by the Departments of Natural Resources of Minnesota and Wisconsin. Data developed in this project will form the basis for implementation of flood-plain regulations required under the State Flood Plain Management Act. Some of the studies have indicated significant potential increases in flood stages owing to recent developments in the flood-plain areas.

Additional flood-plain studies will be made for selected communities and for major stream corridors through the Twin City metropolitan area as funds permit.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 6.0305, FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, St. Paul, Minnesota 55414

Recurring flooding of Minnesota streams causes increasing

tion is available for the delineation of flood plains and floodways. Municipalities along the lower Minnesota River suffered extensive damage in the floods of 1965 and 1969. The lower Minnesota River Valley is one of the most critical flood prone areas of the state.

The study will provide the data necessary for the development of a flood-plain management program for the lower 35 miles of the Minnesota River. It will furnish a basis for the state to coordinate and evaluate the effects of the flood-plain management activities of the several communities along the river. The profile and area inundated by the 100-year flood will be shown by a strip map. Floodways designated by the state and local interests will be evaluated by the step-backwater method. Concurrently, HUD Type 15 flood insurance studies will be made for Bloomington, Carver, and Chaska.

Photogrammetric techniques will be used for obtaining the valley cross sections and the step-backwater method employed to develop a profile for the regional (100-year) flood. A digital computer model will be constructed and tested against available historic flood profiles. The model will then be used to define the profile for the regional flood and the flood plain will be delineated on maps. The effect of proposed flood plain encroachments will be evaluated and floodway limits tested until an acceptable configuration is achieved. The accepted floodway will also be shown on the maps.

Step-backwater computations have all been completed. Flood-plain areas have all been delineated and surcharge effect on the 100-year flood, resulting from proposed encroachment to the floodway limits, has been determined. Final drafting of the report and preparation of the text is nearly completed. The study has pointed out the significant amount of backwater resulting from recent developments in the flood plain, which has prompted the adoption of more restrictive measures by regulatory agencies.

Final report will be published.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0306, SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA

J.J. WAELTI, Univ. of Minnesota, School of Agriculture, St. Paul, Minnesota 55101

The State of Minnesota has only recently undertaken significant comprehensive water resources planning activity. The State's first assessment of water and related land resources has been completed. The assessment has a time horizon of about 50 years, and represents an attempt to identify emerging problems in water and related land resources development and management.

While the assessment encompasses a time horizon of about 50 years, the State executive branch and the Legislature generally operate within a limited time horizon of two to 10 years to allocate the efforts of the State Government. In the near future, significant decisions will have to be made which will necessitate, either implicitly or explicitly, selection of policies regarding flood plain management or non-structural alternatives versus structural flood control projects; advanced waste treatment versus low flow augmentation; shoreland management versus corrective measures for water quality;

identify the economic and social consequences of alternative courses of action. 3) To evaluate the economic and social consequences of alternative actions so that a rational basis for decision making can be presented.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0307, URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (ABBREV)

J.A. ELLIOTT, Diversified Consultants Inc., Jackson, Mississippi

Abstract: The report presents long-range plans for flood plain management and storm drainage improvements in the four-county Mississippi Gulf Region.

Pub. 1972: 173p., NTIS No. PB-212 432: PC \$10.75 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0308, URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV)

J.A. ELLIOTT, Diversified Consultants Inc., Jackson, Mississippi

Abstract: The report presents the goals, objectives, and standards of the Gulf Regional Planning Commission (Hancock, Harrison, Jackson, and Pearl Counties, Mississippi) for urban systems services including waterworks, sanitary sewerage, solid waste management, storm drainage and flood plain management.

Pub. 1972: 181p., NTIS No. PB-212 429: PC \$11.25 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0309, ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI

P.J. BARLOW, State Comm. & Area Dev. Div., Jackson, Mississippi

Abstract: The zoning ordinance establishes regulations governing the use of land within the corporate limits of Friars Point, Mississippi. These regulations are designed to implement the recommendations outlined in the future land use plan for the town and to promote procedures for adoption, amendment, and enforcement. The subdivision regulations establish regulations governing the subdivision of land within the corporate limits of the Town of Friars Point, Mississippi. These regulations provide for filing subdivision plats; establish design standards; and provide procedures for adoption, amendment, and enforcement.

Pub. Apr. 72: 45p., NTIS No. PB-212 329: PC \$4.25 MF \$0.95.

SUPPORTED BY Mississippi Res. & Dev. Center - Jackson

#### 6.0310, CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY

B.E. WASSON, U.S. Dept. of the Interior, Geological Survey, Jackson, Mississippi 39205

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Mississippi.

Purpose: To provide hydrologic data which will enable planners

potential of the Wilcox Group for industrial supplies will be collected. Site studies will be made where shallow ground seepage is a problem in city construction.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0311, CITY OF JACKSON WATER RESOURCES STUDY

K.V. WILSON, U.S. Dept. of the Interior, Geological Survey, Jackson, Mississippi 39205

The occurrence of damaging floods in recent years has caused citizens and city officials to consider flood control measures and to cooperate with the USGS in collecting the basic hydrologic data on which to base a sound design. As part of a water development and management program, the city of Jackson cooperates with the USGS in appraising the ground-water resources of the Jackson vicinity in order to have this information available for possible emergency on supplemental water supplies for Jackson and for industrial prospects.

To develop flood profiles and flood-inundation maps for principal streams in the Jackson vicinity. Collect flood data for (A) hydraulic studies as requested for existing or proposed culverts, bridges, or channels in the city; (B) consultation with industrialists or others concerning flooding; and (C) preparing flood reports of unusual floods. To keep abreast of ground-water supply development and monitor the effects of withdrawals.

A network of rain gages and streamflow gages will be established to appraise flooding. Following extreme floods, special surveys of rainfall and flooding will be undertaken to supplement the gaged data. Urban flood-frequency studies, incorporating natural and land use parameters, will be made and the results used in developing profiles and inundation for selected floods. A network of selected observation wells will be monitored to follow the water-level trends in the principal aquifers. Ground-water pumpage will be inventoried periodically. Special studies concerning ground-water quality and shallow seepage will be made as their need arises.

Routine operation of gaging streams and wells was continued. An inundation map of the Jackson quadrangle (7-1/2 minute) showing limits of the 100-year flood for all major streams was completed. A special study of a rectified channel, 12 feet deep, showed that vegetation growth over the 8-year period since rectification reduced the carrying capacity of the channel by more than 300 percent at half-bankfull stages. Well records in the Jackson area were coded for computer processing.

To submit for publication an inundation map showing limits of 100-year flood for all major streams in Jackson quadrangle (7-1/2 minute). Continue coding well records in Jackson vicinity for computer processing. Update well inventory of the greater Jackson area.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0312, MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY

J.J. FRANCO, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Purpose of study/investigation: To investigate navigation conditions in the lock approaches and effects of the structures on flood stages.

Approach or plan: Two models were used in this study. A 1:120-scale model reproduced about 9 miles of the river and adjacent overbank areas. A 1:25-scale model reproduced 500 ft of the lock approach channel, intake manifolds, the lock chamber, culvert, sidewall port manifolds, outlets and 200 ft

Filling and Emptying System, Cannelton Main Lock, Ohio River, and Generalized Tests of Sidewall Port Systems for 110- by 1200-ft Locks; Hydraulic Model Investigation, was published in February 1966. A final report on the 1:120-scale model is in preparation.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0313, MISSISSIPPI BASIN MODEL

UNKNOWN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Purpose of study/investigation: To study the coordination of releases from reservoirs, investigate the effect of reservoir operation on flood stages, check the routing of project and other floods, establish and check levee grades, predict stages, and determine the effect of floodways on stage reduction.

Approach or plan: To study various reservoir operation procedures and their effects on downstream stages and discharges. To study various levee alignments and other structures in the flood plain and their effects on stages and discharges.

Progress to date: Testing was begun in February 1951, and various testing programs have been conducted on the model since that time for the Office, Chief of Engineers, Lower Mississippi Valley Division, Southwestern Division, Ohio River Division, Missouri River Division, various State agencies, and a few private businesses. Reports of tests have been published and most are available on loan from the library at the Waterways Experiment Station.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0314, DEMONSTRATION OF THE ELECTRIC ANALOG MODEL OF THE KANSAS RIVER AT THE UNIVERSITY OF CALIFORNIA IN BERKELEY

UNKNOWN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: An electric analog model of the Kansas River is described for studying flood flows and flood forecasting.

Pub. Jun. 63: 26p., NTIS No. AD-733 953: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0315, FORT SCOTT LAKE, MARMATON RIVER, KANSAS

UNKNOWN, U.S. Army, Engineer District, Kansas City, Missouri 63120

Abstract: Construction of a dam and lake in Bourbon County, Kansas, will provide flood protection, water quality control, water supply storage, recreation, and fish and wildlife enhancements. The lake will inundate 5,000 acres of land and eliminate 25 miles of Marmaton River and tributary streams and associated fish and wildlife habitat.

Pub. Jul. 71: 13p., NTIS No. PB-201 520-D: PC \$3.00.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0316, DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI

L.D. HAUTH, U.S. Dept. of the Interior, Geological Survey, Rolla, Missouri 65401

Magnitude and frequency of flooding in Missouri has been adequately defined for areas draining greater than 50 square miles, but frequencies for greater than 25-year recurrence intervals have not been defined for areas draining less than 50 square miles. Peak-flow data on small drainage areas are of inadequate length to define frequency of flooding greater

(1) To define magnitude and frequency of flooding for areas draining less than 50 square miles; (2) Determine any regional patterns that may exist resulting from regression analysis of peak-flow data; (3) Determine future needs for data collection in the small-streams network.

Existing short-term rainfall-runoff data on approximately 50 small stream stations will be calibrated to a mathematical model. Long-term precipitation data will then be used to generate long-term peak-flow data. Resultant long-term peak-flow data will be fitted to the Log-Pearson Type III distribution. Regression analysis will be made using physiographic parameters to obtain optimum equations for the 2-, 5-, 10-, 25-, 50-, and 100-year flood.

Project is 95 percent complete. Report is in colleague review to complete report.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0317, HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA

D.W. SPENCER, U.S. Dept. of the Interior, Geological Survey, Rolla, Missouri 65401

Four major drainage basins in the metropolitan St. Louis area are now being used to drain uncontrolled storm water from many urbanized areas. Storm waters carried away by these streams are increasing with increased urbanization, causing greater flooding and erosion. Little or no information on the hydrologic characteristics of these basins is available, nor is any available on the effects of urbanization on the basins runoff. Knowledge of the hydrologic characteristics and the effects of urbanization will be a valuable tool in the economic and effective design of channel improvements now and in the future.

Furnish designers and planners basic information on the hydrologic characteristics of the project basins. To analyze basic hydrologic data to determine frequency of flooding and effects of urbanization upon the rainfall-runoff relationship.

Approximately 100 crest-stage gages will be constructed along each stream to record flood profiles. Through interview of local residents historic flood elevations will be used to develop flood-inundation maps. Continuous recorders placed near the mouth of each basin will provide stage-discharge relationships that will indicate basin discharge. Flood-hydrograph recorders with synchronous continuous rainfall recorders located near the centroid of each basin along the stream channel will be used as an aid to define urbanization effects. Urbanization effects will be shown by relating lag time between mass of rainfall and mass of runoff to basin characteristics.

Flood data on historical events outside the period of record has been collected in all basins and reports published. Stage-discharge relations have been established at about 75 percent of the gages. Basin parameter determination is about 50 percent complete.

Continue collection of rainfall, stage, and discharge data. Analysis of data for a report on rainfall-runoff relationship. Reduce the number of recording gages to the ones that have ratings or the best chance of rating. Enter all data gathered to data on disk storage and commence calibration runs and synthetic runs on long-term rainfall.

Construction of flood-control reservoirs and the allocation of capacity in multi-purpose reservoirs for flood control have increased in recent years. Growth in numbers and capacity of flood-storage projects appears to be continuing. Additional data are needed for the planning, design, construction, and operation of projects that include the storage of flood waters.

The objectives of the study are to present (1) processed flood-volume-recurrence data for all long-time continuous-record stations and those short records that can be extended by regression analysis; (2) Regional equations for the estimation of flood-volume-recurrence data at ungaged sites.

The analysis will be made by using methods outlined by G.A. Kirkpatrick and H.C. Riggs in administrative reports prepared in the hydrologic studies section. The Log-Pearson Type III distribution will be fitted by computer to the logarithms of the tabulated highest mean discharges for various durations to obtain flood-volume-recurrence data for each station. Special emphasis will be placed on recently available data from drainage areas of less than 50 square miles. When all station data have been analyzed, regional equations for plains and plateaus will be defined by utilizing STATPAC computer programs.

During 1973 fiscal year computer work was completed and regional flood-volume equations for the plains and plateaus were finalized. Work was completed on the report manuscript, colleague reviews were obtained, and the manuscript received approval by regional staff and Director's Office. Publication as a report in the Water Resources Report Series of the Missouri Geological Survey occurred near the end of the fiscal year.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0319, HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Rolla, Missouri 65401

As the population of St. Louis City declines the population of St. Louis County increases. Substantial changes are being made in the use of land in the rural areas. Storm-water drainage is one of the principal problems. Inadequate data for planning of roads, use of flood-plain areas, zoning ordinance on land use and channel improvements necessitate collection of data suitable for flood-inundation maps and other analyses.

To determine the effects of urbanization on runoff from small streams in St. Louis County, Mo.

Reconnaissance of streams which drain the areas that will be affected by urbanization will be made to determine the number of data collecting sites needed for definition of the hydrologic characteristics of the area. Flood data will be collected at many sites on a continuing basis to define flood frequencies, flood profiles, channel shapes and capacities, flow characteristics and other factors needed to study the suburban-rural hydrology. Gaging stations, crest-stage gages and precipitation stations will be installed at a sufficient number of sites to furnish the data needed for the analysis outlined above.

Data collection sites and basin parameter calculations have been completed. Stage-discharge relationships are being



RIVER BASIN, MERAMEC RIVER, MISSOURI  
UNKNOWN, U.S. Army, Engineer District, St. Louis, Missouri  
63120

Abstract: An appendix to the environmental impact statement draft for Meramec Park Lake on the Meramec River, Missouri, contains information on area flooding, earthquakes, water wells, soils, flora and fauna taxonomy, aquatic biota, wildlife, and aquaculture.

Pub. Apr. 73. 144p., NTIS No. EIS-MO-73-0996-D-2: PC \$9.25.

SUPPORTED BY U.S. Dept. of Defense - Army

# 6.0321, FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA

K.M. NOLAN, Montana State University, Water Resources Research Ctr., Bozeman, Montana 59715

Abstract: Flood hazard maps, delineating 50-year and 100-year flood plain areas, were prepared for an 80-mile reach of the Bitterroot River in Western Montana. Discharge rates corresponding to 50-year and 100-year recurrence frequency were obtained for six stations on the river using graphical methods suggested by the U.S. Geological Survey. River stage was monitored at 15 locations in the reach for a 14-day period during the June 1972 snowmelt runoff season to develop simulated rating curves. Aerial photographs of the reach were taken on June 1, 1972 when the river was in flood stage but before the snowmelt peak had occurred. The photographs were used in conjunction with the ground control sites to establish flood boundaries corresponding to 50 and 100-year floods.

Pub. Oct. 73. 103p., NTIS No. PB-226 082/6: PC \$4.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

# 6.0322, EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY

A.B. CUNNINGHAM, Univ. of Nevada, Desert Research Institute, Reno, Nevada 89507

Various commonly used methods of flood peak prediction for ungaged basins will be applied in two hydrologically dissimilar regions of Nevada. Results will be analyzed with regard to making the following comparisons. First, the relative differences resulting from the application of the various prediction procedures to individual study area watersheds will be determined. From this information generalizations will be made as to the magnitude of variation which can be expected in the use of particular prediction methods in semi-arid areas. In addition, comparisons of the flood peak recurrence interval values produced by each method for all study watersheds will be used to determine the degree of variation to be expected for each particular prediction method. Final results and comparisons will be evaluated with regard to current dam and spillway safety criteria.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

# 6.0323, HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY

K. NATHAN, Rutgers the State University, Agricultural Experiment Sta., New Brunswick, New Jersey 08903

The effect on the rainfall-runoff relationship on small watersheds in central New Jersey as the land use changes from agriculture and forestry to suburban development is

water and soil resources in agricultural areas undergoing urban development will be determined. Rainfall will be measured by recording rain gages with punched paper output. Runoff will be obtained by means of stage recorder with punched paper output. Pertinent parameters of the watershed will be determined from available aerial photographs and contour maps. Surveillance on land use will be kept by inspection.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY New Jersey State Government - Trenton

# 6.0324, ECONOMIC BASIS FOR WATER RESOURCE ANALYSIS

W. WHIPPLE, Rutgers the State University, Water Resources Research Inst., New Brunswick, New Jersey 08903

Abstract: The work provides improved economic principles and methodology for water resources planning. A basic utility function is proposed, which can be quantified for special cases where income redistribution is relevant. A stochastic approach is developed to provide a quantitative utility function of uncertainty, based upon social value at risk inferred from insurance and other fields. The analysis and theory of opportunity costs is used to derive a discount rate to government discount rate, and to the consistency of taxation in comparisons of projects with alternative uses. In the field of hydroelectric power, it is shown that these principles will approximately halve traditional benefit-cost estimates. A special study of flood control provides a new approach to the optimal degree of protection, and to flood plain management through consideration of project-induced investment in hazard areas. Essential principles are given for an evaluation of the benefits of pollution control and a methodology for optimizing planning including water quality objectives.

Pub. Jun. 68. 128p., NTIS No. PB-203 346: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

# 6.0325, FLOOD PLAIN AND PEAK FLOW STUDY - NEW JERSEY

T.G. ROSS, U.S. Dept. of the Interior, Geological Survey, Trenton, New Jersey 08607

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of New Jersey.

Purpose: To provide information on the extent and frequency of floods.

Methods: Crest-stage gages are installed at key sites on the river to collect flood peak data. A rating curve for each gage is defined by discharge measurements. Historical flood data are obtained by interviews with local residents, state and federal agencies. Field surveys are made to obtain cross-sections, flood profile, thalweg, and bridge data. Flood frequency analyses are made and maps prepared.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

# 6.0326, DETERMINATION OF FLOOD PEAKS, RATING CURVES, PROFILES, & FLOOD INUNDATION - NEW JERSEY

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Trenton, New Jersey 08607

The N.J. Department of Environmental Protection, Division of Water Resources, has requested an updated study and analysis on magnitude and frequency of floods in N.J., including effects of urbanization. The Division of Water Resources is

the county of Bergen need flood information on small watersheds for investigative and planning purposes. The statewide program for flood-plain regulation and flood insurance and the need to resolve past conflicts between the Bureau of Public Roads, N.J. Dept. of Transportation, and the Division of Water Resources as to design criteria for bridge waterway openings require this comprehensive regional study.

Update and refine previous study of the magnitude and frequency of floods in N.J. (Water Resources Circular 13, published by N.J. Division of Water Policy and Supply in 1964) to include subsequent years of flood data and to extend coverage to watersheds as small as one square mile and to quantify the effects of urbanization on flood magnitude and frequency in the past, at present and in the future. Collect high water data and flood marks for significant storm events and publish peak discharge at 51 sites in annual reports of USGS.

Annual peaks for entire period of record and selected time increments will be analyzed in terms of Log Pearson Type III and studied in relation to quantitative indices of urbanization estimated for corresponding time periods for gaging stations in N.J. Coefficients for increase in size of floods for varying degrees of urbanization will be developed. Regionalization of station flood-frequency by multiple regression will be attempted using both natural and urban-related basin characteristics so as to provide for usable estimates of spatial as well as future flood magnitude and frequency based on population projections.

Seven new crest-stage partial-record stations were established. Rating curves were developed for these stations and updated for 54 other crest-stage stations. Discharges were published in annual report of USGS. Flood-frequency curves were updated and defined for 114 gaging stations based on the most recent annual peak data and improved analytical techniques. A preliminary method was developed, estimating flood-peak magnitudes having recurrence intervals ranging up to 100 years for ungaged basins greater than 1 sq. mi. with various degrees of urban and suburban development. (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0327, FLOOD FREQUENCY STUDY IN NEW MEXICO

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Albuquerque, New Mexico 87106 (2R23001616)

Hydrologic data are being obtained and analyzed to relate the magnitude, volume and frequency of floods for drainage areas of less than fifteen square miles to basin parameters. Representative basins to include ranges of topographic, geologic and climatic characteristics will be measured in detail and methods devised for transferring information to other basins.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 6.0328, THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I

A.C. TEDROW, State Div. of Water Resources, Albany, New York 12226

New York, was used as the vehicle for carrying out the project. In applying systems analysis techniques to the river basin, a number of models were constructed. Management programs were analyzed on two different time bases; one, an overall budgeting or allocating of waters to various purposes on a long time interval and the other, the operation of the physical system on a transient basis during flood periods. As a result, a monthly or 'conservation' simulation model, a monthly optimization model, and a flood simulation model were developed. The flood routing model was a mathematical representation of a hydraulic system and consisted of the lakes and reservoirs in the Oswego River Basin and their connecting waterways.

Pub. Jun. 70: 145p., NTIS No. PB-199 539: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0329, STREAMS AND DRAINAGE BASINS - FULTON COUNTY, NEW YORK

UNKNOWN, State Off. of Plan. Services, Albany, New York 12207

Abstract: The report indicates the methodology used in measuring and delineating the drainage basins of all streams in Fulton County. The report contains a sample for one basin with map and figures. In addition, the report includes potential impoundment areas and existing flood prone areas in Fulton County.

Pub. Dec. 70: 45p., NTIS No. PB-201 884: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0330, PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION

UNKNOWN, State Off. of Plan. Services, Albany, New York 12207

Abstract: The Official Map for the County of Putnam was established to enable the County to utilize certain regulatory powers which are essential if orderly growth and development are to be ensured throughout the County. This map also provides the means by which adequate facilities for the safe, convenient and efficient vehicular movement of people and goods can be achieved and for the protection of the public from flood damage. These matters are considered to be in the interest of the public, for the promotion of the safety, convenience and general welfare of the County. The Putnam County Official Map facilitates the planning and development of County roads, public sites and drainage systems by the protection of rights-of-way that will be needed for the widening, realignment or construction of new or existing County roads, public sites and the protection of drainage systems from encroachment or excessive runoff.

Pub. Jan. 71: 52p., NTIS No. PB-197 771: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0331, FLOOD INVESTIGATIONS - NEW YORK

B. DUNN, U.S. Dept. of the Interior, Geological Survey, Albany, New York 12201

Provide information on magnitude and frequency of flood events to agencies and individuals involved in various phases of flood planning and design. Develop regional flood frequency relationships for the entire State of New York.

Flood data will be collected at crest-stage stations, and annual peak discharges will be published. Discharge will be determined for flood events, flood profiles will be defined, and information on flood plain mapping will be collected. Reports will be prepared covering individual events as well as an annual summary of floods. As data becomes available, an analysis will be made to improve flood frequency relationships for the state.

Annual flood summary work continued. Several bridge site and highway alignment studies were made. Major effort was devoted to collecting and compiling data for areas affected by June 1972 floods. Indirect measurements of discharge were made, flood profiles determined, 39 flood maps were prepared and 2 hydrologic atlases were prepared.

Annual flood summary report for 1972 will be completed and that for 1973 prepared. Several bridge site and highway alignment reports will be prepared. Flood frequency analyses will be made and list of maximum stage and discharges will be updated.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0332, COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y.

UNKNOWN, Aurora Planning Board, Aurora, New York 13026

Abstract: The resultant Comprehensive Plan for East Aurora, and Aurora, New York, includes proposed Land Use Plans for the Village and Town, Street and Highway proposals, with emphasis on the reduction of through-traffic in residential neighborhoods in the village; a special study on the relation of surface water drainage, public sewer and water to land forms and soil types, with a timetable for development; alternative plans for residential subdivision; and a Community Facilities Plan with suggested park designs. The Implementation section, in addition to its discussion and recommendations concerned with regulatory measures and finances, proposed amendments to the local zoning ordinances and official map which include a 'flood plain sector' in the village and a 'conservation sector' in the town.

Pub. Jun. 70: 123p., NTIS No. PB-192 382: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0333, NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE

H.H. LADAGE, Columbia Co. Planning Dept., Hudson, New York 12534

Abstract: Topography, slope, flooded areas, swamps, wooded areas, drainage and areas of distinctive vistas were examined. The material obtained in the study will be used to guide development, aid in developing a County Comprehensive Plan and also to form the basis for an environmental study.

Pub. May 72: 49., NTIS No. PB-213 708/4: PC \$4.50 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

A three phase research program over a two year period is envisioned. The first phase should produce two results: (1) an evaluation of recent performance of institutional arrangements for flood risk management from several points of view; and (2) a specification of the flood management strategy that is currently seen as ideal in our conventional wisdom. The second phase should produce a critique of the 'conventional ideal strategy' based upon an improved understanding of institutional behavior. Inter-organizational relationships, political and administrative processes will be studied to identify why this strategy is not applied and what institutional changes would be necessary to actually achieve it. The third phase should produce an improved ideal strategy and the specifications for institutional redesign needed to attain it. This improved ideal strategy will hopefully provide a better blend between technical efficiency and political reality.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0335, STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS

J.R. FERGUSSON, Cornell University, Water Resou. & Marine Sc. Ctr., Ithaca, New York 14853

Abstract: The report is the fourth of a sequence of studies using optimization and simulation techniques to analyze a variety of metropolitan water resource problems. The first chapter discusses some linear or separable programming models for defining and analyzing alternative investment and operating policies for regulating and allocating metropolitan surface water supplies and for the reduction of flood damages. The second chapter reviews a variety of surface water quality management models for rivers, lakes and estuaries. The third and final chapter is a state-of-the-art paper on models for the control of flood flows and reduction of flood damages.

Pub. Feb. 72: 240p., NTIS No. PB-209 209: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0336, THE POLITICAL ECONOMY OF WATER RESOURCES

D.J. ALLEE, State University of New York, Agricultural Experiment Sta., Ithaca, New York 14850 (NYC-121432)

Objective: Develop and apply principles for water resources management that relate the concepts of economics, political science, public administration, and other disciplines. Identify alternative strategies of public water resources management and their likely effects. Identify and evaluate changes in institutional arrangements for water and related land resources, including policy and budget-making processes, interest group accommodation and conflict processes and the law of property and public regulation.

Approach: Individual problem areas will be isolated and explored in reaction to the internal logic of each problem area. Initial emphasis will be on: coordination of Federal and State policy making, public participation in planning, environmental problems in basin management with emphasis on lakes and planning methodology with special emphasis on supply and demand factors, and relating planning to program budgeting.

## MAJOR DISASTER TYPES

vironmentalists. The result would be a stronger role for the states and particularly the governors, through basin commissions. Also, progress on a review of cost-sharing for waste treatment and flood control, produced some recommendations for federal and state programs, including flood insurance. Basin planning and management arrangements need citizen support and alternative approaches for achieving this have been developed based upon case studies of New England and Delaware. Also, the strategies open to Basin Commissions to become politically viable were identified. A review of population policy issues and how they might affect federal water programs was completed.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

### 6.0337, APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN

J.W. KELLEY, State University of New York, Agricultural Experiment Sta., Ithaca, New York 14850 (NYC-147313)

Objective: Develop a procedure for utilizing technical aspects of New York State Land Use and Natural Resources (LUNR) system more effectively in water resources planning and more specifically in terms of flood plain management in the Susquehanna River Basin.

Approach: The Elmira-Horseheads New York region will be the study area. The research will include manipulation of actual LUNR inventory data, identification of decisions and display procedures. Emphasis will be placed on flood plain identification and characterization via remote sensing, data use for water planning needs and an evaluation of feasibility of developing an improved LUNR system for the Susquehanna River Basin.

SUPPORTED BY New York State Government - Albany

### 6.0338, HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES

M.B. MCPHERSON, Amer. Soc. of Civil Engrs., New York, New York 10017

Abstract: The contents include the following topics on urbanization's effects upon hydrology: Urbanization indicators; Character of precipitation; Micro-scale climatic effects; Major effects resulting from urban water resources facilities; Projected impact of community-scale urban water conservation measures; Water supply impact; Flooding effects; Pollution effects; Effects of mining activities; Effects of other water-body uses; Water balance inventories; Outline for selected case studies.

Pub. Jun. 72: 54p., NTIS No. PB-212 579: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

### 6.0339, URBAN RUNOFF

M.B. MCPHERSON, Amer. Soc. of Civil Engrs., New York, New York 10017

Abstract: The report is a review of the effects of urbanization on hydrology. Topics discussed include the following: Urban stormwater disposal; Land-use changes; Morphological changes in drainage; Changes in flood characteristics; Flood mitigation versus the amenities of drainage; Some management possibilities; Research status and needs.

Pub. Aug. 72: 53p., NTIS No. PB-212 580: PC \$3.00 MF \$0.95.

Abstract: The report presents an analysis of the four drainage basins within the Genesee/Finger Lakes Region. It provides basic information that will be utilized in planning and recommendations for the Region. A brief description of the area, topography, climate, population and culture introduces the inventory of the Lake Ontario, Oswego and Erie-Niagara Drainage Basins. The Lake Ontario drainage study is devoted to a detailed description of the major lakes, rivers and streams in the four drainage basins. Pub. Oct. 69: 144p., NTIS No. PB-194 682: HC \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0341, EROSION AND DEPOSITION IN THE COASTAL AND ESTUARIES OF THE NORTH CAROLINA

R.L. INGRAM, Univ. of North Carolina, School of Civil Engineering, Hill, North Carolina 27514

The objectives of this project are: (1) to determine the changes that are taking place in the bottom topography and shorelines of selected study areas typical of the estuary environment of the North Carolina coast, especially Pamlico Sound, (2) to study the erosional and depositional processes responsible for these changes; (3) to predict future changes.

How information will be applied: Information gained from the program will be used by State and Federal agencies to predict the effects on erosion and deposition of (1) changes in river regime from floods, droughts, dam construction, conservation practices; (4) opening and closing of dredging activities; (6) construction of shoreline protection; (7) shoreline and bottom mining.

Accomplishments during the past twelve months: Over 100 aerial photographs of the study areas have been obtained and are being studied. Detailed bathymetric tracings have been made. The heavy mineral content of 173 samples has been used to estimate the source of the sands being deposited in the sounds and estuaries. The clay mineral content of 173 samples has been used to estimate the source of the silts being deposited in the sounds and estuaries. Bottom samples are being taken in the study areas.

SUPPORTED BY U.S. Dept. of Commerce - N.O.

### 6.0342, EFFECTS OF URBANIZATION ON FLOODING IN CHARLOTTE, NORTH CAROLINA

W.H. EDDINS, U.S. Dept. of the Interior, Geological Survey, Raleigh, North Carolina 27607

The City of Charlotte is faced with the problems of flooding and damage resulting from flooding of small streams as the need for flood-profile elevation so that new developments will not be subjected to flood damage. The problems include design of small bridges, culverts, sewers, and stream-channel improvements under existing conditions of the higher-peak flows associated with urban development. In the extended project beyond June 1972, the problem of flood-plain use and the alternatives for defining floodways are paramount.

Hydrologic data before and after urban development are usually unavailable. Therefore, rainfall and runoff data from watersheds that are in the same region but in different stages of urbanization will be used for analysis and comparison. Discharge measurements, the analysis of stream

Continuous rainfall and runoff data will be recorded concurrently at selected sites. The recorded data will be used in conjunction with long-term rainfall data to generate expected long-term runoff data. The generated data and observed short-term data along with observed long-term data in the region will be used in several linear regression models for determination of relationship to basin characteristics for which physical factors and changes can be evaluated. Significant factors will be combined in formulas for peak runoff having selected recurrence intervals. After June 1972, the peak runoffs will be used in step-backwater and other studies to define flood profiles and floodways.

A report, HB32, defining the effect of urbanization on flooding, was published during the fiscal year. A study was completed showing the percent of impervious cover found in typical urban and exurban environments. Work has progressed in delineating flood boundaries along many streams in the area. The first set of flood maps, those for McMullen creek, were released to the cooperators.

It is planned to complete and release 100 maps defining flood profile and floodways along all stream with a drainage area of one square mile, or more (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0343, EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA

A. I. PUTNAM, U.S. Dept. of the Interior, Geological Survey, Raleigh, North Carolina 27607

The City of Morganton (as most cities) is faced with problems of drainage and damage resulting from flooding of small streams. Drainage problems include design of small bridges, culverts, storm sewers, and stream-channel treatment. Because of urban developments in the basin and flood-plain encroachment, many areas which were formerly rarely inundated are now flooded with increasing frequency.

Hydrologic data before and after urban development are usually unavailable. Therefore, rainfall-runoff data from watersheds that are in the same region but in different stages of urbanization will be used for analysis and comparison to:

- (1) Evaluate quantitatively the flood potential of urban watersheds smaller than 5 square miles.
- (2) Derive usable relationships for determining peak discharge from small urban watersheds by evaluating the effect and relation of various natural and urban characteristics.

Continuous rainfall and runoff data will be recorded concurrently at selected sites. The recorded data will be used in conjunction with long-term rainfall data to generate expected long-term runoff data. The generated data and observed short term data along with observed long-term runoff data in the region will be used in several linear regression models for determination of relationships to basin characteristics for which physical factors and changes can be evaluated. Significant factors will be combined in formulas for peak discharges having selected recurrence intervals.

Analysis of the data for this project has been completed, and preparation of the final report has been started. Previously investigators have used a family of curves, each depicting a different degree of urban development, to relate basin lag time to the stream length divided by the square root of the stream slope. For this project the ratio of the area of impervious cover to the total drainage area was included in the analysis to define the basin lag time equation. As a result, only one curve is required to depict any degree of urban

O.A. CROSBY, U.S. Dept. of the Interior, Geological Survey, Bismarck, North Dakota

There was no information on frequency and magnitude of small-stream floods in the state at the time of the study. The methods being used to obtain hydrologic information and culvert design were unsatisfactory. Design procedures, especially critical on flood runoff from small watersheds.

To provide guidelines for culvert and bridge design from hydrologic data currently available, to obtain hydrologic data on small watersheds to supplement data currently available, to obtain a general history of flood events for a period of time, and to provide a concise and usable report for future culvert and bridge design.

A report on magnitude and frequency of floods was prepared from existing data. Seventy-nine small watersheds are instrumented for the collection of peak flow and other parameters that may have an effect on flood magnitude. All major flood events will be documented in a comprehensive analytical report utilizing all data prepared.

Peak stage and flow data were collected at all sites. Work completed on determination of drainage areas and basin parameters. Peak flow data were published in the report "Water Resources Data for North Dakota, 1967". Work has commenced on analysis of the data.

A frequency report will be completed based on existing data. Program objectives will be reevaluated. Peak stage and flow data will be collected during the year.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0345, COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACT

G.M. CLARK, Ohio State University, School of Engineering, Columbus, Ohio 43212 (C-4184)

The key element in the proposed research is the development of a dynamic feedback model which describes regional economic development, recreational facility utilization, damage phenomena, and hydraulic and hydrologic characteristics of the region. The model will be constructed to explicitly evaluate the following aspects of a regional flood plain management program: 1) land use controls; 2) of defining the flood plain and floodway; 3) the utilization of the flood plain; 4) level of administrative and technical assistance provided local communities; 5) flood insurance and flood proofing; and 6) potential of flood control projects.

The model will accept input data which describe: 1) the methods of flood plain management available in the region; 2) the nature and extent of flood prone areas in a region; 3) the attitudes of flood plain occupants and other interested parties regarding key aspects of flood plain management.

A time history of the dollar and nondollar costs arising from alternative programs of regional flood plain management will be predicted. The levels of impact on economic indicators will also be predicted to give the decision maker a clearer insight into the overall effect of flood plain management program. As the final product of the proposed research, the model will be applied to a flood prone region in Ohio.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res.

In designing a flood plain management program, the program alternatives that must be considered consist of various procedures for delineating the flood plain, methods of data processing, and techniques for data collection. Cost and effectiveness criteria are needed to evaluate these alternative flood plain management programs. The cost to implement a particular program can be predicted using objective information. Conversely, subjective opinions must be used to estimate relevant effectiveness measures. Research is being conducted to explore various methods of measuring program effectiveness, and the effect of these measures on ultimate program design.

SUPPORTED BY Ohio State University

#### 6.0347, DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM

G.M. CLARK, Ohio State University, School of Engineering, Columbus, Ohio 43212

The objective of this research has been the determination of cost-effective technical procedures which can be efficiently used in the proposed Ohio Flood Plain Management Program. The recommendations in the final report represent a ten-year technical plan for use by the Ohio Flood Plain Management Program. These recommendations are derived from an analysis of program requirements and a program effectiveness model developed for this research. The first phase of the program can be immediately implemented to conduct engineering analyses of flood prone areas, through delineation of areas subject to periodic flooding and evaluation of flood-plain encroachments on flood elevations.

SUPPORTED BY Ohio State Government - Columbus

#### 6.0348, STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY

V.T. RICCA, Ohio State University, School of Engineering, Columbus, Ohio 43212

A pilot study on the practical application approach of: Utilizing digital computer models for: (1) Streamflow simulation (small urbanizing watersheds with refined data and large watersheds with coarse or limited data) and (2) Stream hydraulics analysis including normal depth, backwater curves for water surface elevations, and localized channel restrictions (bridge abutments, landfills, etc.). Also studied: Employing conventional methods (computer assisted where practical) for ascertaining required data for models: hydrologic, climatic, and geomorphologic for streamflow simulation; channel cross-sections, roughness coefficients, and bed slope for the stream profile determinations; and flood flow frequency analysis. The aim is to delineate zones of probable inundation.

SUPPORTED BY Ohio State Government - Columbus

#### 6.0349, FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS

E.E. WEBBER, U.S. Dept. of the Interior, Geological Survey, Columbus, Ohio 43212

Knowledge of the frequency and magnitude of floods is a prerequisite to the economic design of highway drainage

The purpose of this project is to supplement the existing project of flood studies and analyses to obtain an adequate measure of flood characteristics for drainage areas of less than one square mile. When sufficient length of record is available, data will be analyzed to establish flood-frequency relationships for small drainage areas, as a basis for improving currently available methodology.

Crest-stage gages will be established at 20 culvert sites. Theoretical stage-discharge relations will be defined by computer analysis. Annual maximum stages and discharges will be documented until sufficient data are obtained for reliable definition of flood frequency relations (about ten years). High-flow current-meter measurements and indirect peak discharge measurements will be obtained to check the theoretical stage-discharge relations. Combined stage and precipitation recorders will be installed at about 5 of the 20 sites. Final report will be a regionalized flood-frequency report for small drainage areas.

Annual peak stages and discharges were obtained, summarized, and published in the annual basic data release. Records of combined stage and precipitation continued to be obtained at five sites on drainage areas ranging from 0.3 to 11.0 square miles. An administrative report based on the five years of record available at the 20 small-area crest stage stations was prepared, and copies distributed to interested parties.

Operation and maintenance of the network of small-stream crest-stage gages and combined stage and precipitation recorders will be continued.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0350, APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971

UNKNOWN, State Water Resour. Board, Oklahoma City, Oklahoma 73112

Abstract: The water and land resources of Region Eight of Oklahoma are described. Topics discussed include a comprehensive development plan; history; geology; soils; hydrology and climatology; National Severe Storms Laboratory; surface water; watershed and floods; and ground water.

Pub. 1971: 143p., NTIS No. COM-71-00511: PC \$3.00 MF 00.95.

SUPPORTED BY U.S. Water Resources Council - Wash., D.C.

#### 6.0351, APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA

UNKNOWN, State Water Resour. Board, Oklahoma City, Oklahoma 73112

Abstract: This is the ninth in a series of twelve reports which are part of the first phase of gathering information basic to the eventual state-wide water plan. Various aspects of the needs and assets of the area in north central Oklahoma are described and discussed. Information is given on the geology, soils, hydrology, climatology, surface water, watershed protection and flood prevention, ground water, water quality, agriculture, manufacturing and industry, oil and gas, power and fuel, recreation and wildlife, etc. Maps, charts and tables provide data summaries for the region.

6 0353.

UNKNOWN, Clatsop Tillamook Intergov., Cannon Beach, Oregon 97110

The study describes flooding problems, both tidal and river, of the District and provides considerations and recommendations to help minimize flooding damage. Sample flood plain and geologic hazard ordinance information, river cross-section data, along with examples of building permit waivers for geologic hazard, ortho-photo flood plain maps of a scale 1" equals 400' of selected rivers in the District, copies of which may be obtained at either the Clatsop or Tillamook County Courthouse. An extensive bibliography is provided should additional information be required.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0353, A COMPILATION OF FLOOD ABATEMENT PROJECTS IN OREGON

R. E. LEMMER, Oregon State University, Water Resources Research Inst., Corvallis, Oregon 97331

Abstract: The report is designed to serve as a convenient inventory of and reference to flood abatement projects in Oregon. It presents an organized compilation of the location, capacity, and type of flood abatement projects within the state. The report is in the following format. An introductory section outlines the major factors which influence flooding in Oregon. The bulk of the report treats flood characteristics and projects in Oregon on a watershed by watershed basis. Each chapter concludes with a list of flood abatement projects within the basin.

Pub. Dec. 71, 123, NTIS No. PB-206 307, PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

### 6.0354, DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973

UNKNOWN, Lincoln Co. Planning Dept., Newport, Oregon 97365

The report discusses the dangers of flood plain development, reviews the local ordinances which intend to diminish flood hazards, and discusses the federal flood insurance program and the Lincoln County flood level management program.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

### 6.0355, AN EVALUATION OF HURRICANE AGNES FLOODS IN COMPARISON TO BRIDGE DESIGN INFORMATION AVAILABLE FOR PENNSYLVANIA CONTEMPORANEOUSLY

B. M. REICH, Unknown Inst. or Indiv. Grant, Pennsylvania

Abstract: In the years 1970, 1971, design manuals had been issued for State of Pennsylvania on prediction of extreme rainfall and anticipated floods. On June 22, 1972, Hurricane Agnes dumped 13 inches of rain in five days, producing very severe floods. The report presents the results of comparison of extreme floods statistically predicted to actual floods caused by Hurricane Agnes.

Pub. May 73, 58p., NTIS No. PB-220 888/2, PC \$3.00 MF \$0.95.

Abstract: The report gives a comparison of the performance of two recently developed methods for predicting floods in Pennsylvania: (1) PSU method - by Dr. Reich Associates at Pennsylvania State University for run-up to 200 square miles in size (2) PAGE method - Geological Survey for rural watersheds up to 200 square miles in size. Flood flows estimated for these two methods for 42 selected watersheds in Pennsylvania, ranging from 200 square miles in size and 28 to 60 years return period, were compared with the observed data for 2, 10, 25, and 50 years.

Pub. Feb. 72, 115, NTIS No. PB-208 464, PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - FHWA

### 6.0357, THE EFFECT OF GROUND-WATER FLUCTUATIONS ON LOCAL FLOODING IN THE HARRISBURG AREA, PENNSYLVANIA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Harrisburg, Pennsylvania 17104

Since all coal mining operations have ceased in the Harrisburg Valley, the mines have filled with water causing a rise in normal ground water levels in the study area. Most of the area were built during the mining era and have basements that extend down into the water table. The present water table fluctuation. Since 1967 periodic heavy rainfall have frequently caused many homes to be flooded basements.

To determine the source and movements of groundwater, the seasonal fluctuation of the water table was determined, delineate areas and degree of basement flooding, and the factors that control the surface and subsurface water through the above defined areas so that a plan to alleviate flooding can be proposed and evaluated.

Continuously monitor the ground-water level in the study area, basements, and wells to be installed. Prepare a map of the zone of water-level fluctuation. Determine the routing of water in the study area by monitoring, gaging stream flow and conducting seepage studies, feasible, prepare model of area to evaluate alternate flood control actions.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 6.0358, FLOOD-PROOFING REGULATIONS

UNKNOWN, U.S. Army, Engineer District, Harrisburg, Pennsylvania

Existing building codes and regulations do not provide special flood-proofing requirements and minimum standards for design and construction that should be met for structures susceptible to flood damages. A national flood-proofing standards has long been recognized at all levels of government and in the private sector. However, little has been done to develop or assemble information on flood-proofing into a workable set of standards that could be applied. Under its Flood Plain Management Program, the Corps of Engineers has taken the first step towards meeting this need by developing minimum standards of design and construction for flood-proofing of buildings and structures.

This publication is available for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20540.

building codes and regulations. If, on the other hand, a separate 'floodproofing code' for direct adoption by States and local governments is desired, the flood-proofing information contained herein is also sufficient for that purpose.

Pub. 1972: 80p., U.S. Army, Corps of Engineers.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 6.0359, ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS

D.G. AREY, Univ. of Pittsburgh, Graduate School, Pittsburgh, Pennsylvania 15213

Abstract: The authors review and suggest possible changes in Federal water resources policies and programs for reduction of losses from floods, drought, and hurricanes. Federal flood control policy is reviewed, leading up to the analysis of alternatives contained in the 1966 report of a task force on Federal flood control policy which is leading to changes in Federal policy. Response to the drought of the mid-1960's in Massachusetts is analyzed. Arguments are presented against single solutions, and emphasis is placed on the need for research on alternatives.

Pub. Dec. 71: 127p., NTIS No. PB-211 922: PC \$5.45 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 6.0360, SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR

S.M. LEADLEY, Penn. State University, Inst. Res. Land & Wtr. Resour., University Park, Pennsylvania 16802

The social organization of a community adjacent to a newly constructed flood-control reservoir and four reservoir-based recreation areas is under pressure to change. This research has collected and analyzed data from 89 community leaders and their organizations, both public and private. This analysis attempts to relate ecological change to shifts in both individual perceptions and organizational structures and processes.

The project's second phase will estimate the adjustment of households to changes in occupational and recreational opportunities, identify the potential roles of community to its new environment and assess the feasibility of adaptive organizational programs based on membership resources.

Survey data from a 1970 household enumeration will be supplemented by data from studies completed in this community in 1937, 1949, and 1960. Time-series analysis of modes of household and organizational adjustment to environmental change is planned.

Recommendations will be made regarding procedures for reducing social costs of ecological adjustment. Assistance will be given to community organizations as they attempt to identify and perform roles in the community adjustment process.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 6.0361, EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA

B.M. REICH, Penn. State University, Inst. Res. Land & Wtr. Resour., University Park, Pennsylvania 16802

of the 44 cases. The threshold was established in previous studies as the ratio between a 1,000-year flood and an average annual flood, equivalent to about a 5% chance of being exceeded by a worse flood once or more in the next 50 years. Most locations have high probabilities of being struck by far worse floods than they experienced in 1972.

Pub. Jul. 73: 80p., NTIS No. PB-231 871/5: PC \$7.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0362, FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO

UNKNOWN, State Planning Board, Santurce, Puerto Rico

Abstract: The report presents the results of a study to provide flood protection to areas within the Rio Grande de Manati watershed, so as to permit best reasonable use of lands subject to periodic flooding. This study provides information needed for the production of land use recommendations for definite areas subject to floods, but otherwise suitable for urban expansion.

Pub. Jan. 70: 262p., NTIS No. PB-196 488: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0363, MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN

UNKNOWN, State Planning & Grants Div., Columbia, South Carolina

Abstract: A comprehensive development plan containing data relative to the economy, population, goals, physical constraints, existing land use, future land use, and thoroughfares within the area defined as the Myrtle Beach Planning Area.

Pub. Apr. 70: 155p., NTIS No. PB-192 352: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0364, FLOOD PLAIN INUNDATION

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Columbia, South Carolina 29204

Because of damage from major floods, there is a great need for flood-plain zoning. Despite all precautionary measures available, damaging floods occur nearly every year in South Carolina. This project was initiated so as to show precisely the extent of area to be flooded during specific flood events.

The objective is to collect and analyze necessary data to determine stream slope and water surface profiles in those areas where flood damage of greatest magnitude is likely to occur.

The network includes a network of twenty-five crest-stage gages in major river basins. The network will be expanded each year by the addition of approximately twenty-five new stations until the network consists of about 100 stations. These stations, when operated until two or more floods of significant magnitude are experienced, would provide a reliable flood-water-surface slope in the basin reaches between the gages.

Installation of 17 crest-stage gages and collection of data from these stations.



UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Columbia, South Carolina 29204

Prior to this project, there were no USGS gaging stations on small streams in drainage areas 1-40 square miles in South Carolina. This project was initiated because of the need for knowledge relative to magnitude and frequency of floods on small streams for design of highway drainage structures.

The objective is to collect and analyze necessary data and to develop relationships which can be used to determine the flood-frequency characteristics of any small stream in the state.

The project includes a network of 60 stations, each equipped with dual-digital recorders, located to give coverage of the state. The recorders measure stream stage and associated rainfall. The physical characteristics of each selected basin will be tabulated and the stage-discharge relation will be determined at each station. The data collection will involve about 30 flood events. These data will be used in conjunction with a digital computer model of the rainfall-runoff process to extend a record of flood peaks. The observed and computed data will be used to define the flood-frequency curve for each station.

Rainfall and stage data were collected during the year with most stations recording from one to six flood events. Most flood events of significant magnitude occurred during March, July and August. Twenty percent of the stations experienced an estimated 50-year flood.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0366, INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Huron, South Dakota 57350

The safest and most economical design of highway structures requires a knowledge of the magnitude and frequency of peak discharges that may be expected at any given site. Information concerning the characteristic shape of the flood hydrograph is also necessary if storage is to be considered as a factor in the design of culverts in highway embankments.

To obtain an adequate measure of streamflow and basin characteristics which will provide an estimate of the magnitude and frequency of floods which might be expected from small drainage basins in South Dakota.

A total of 80 representative basins have been selected for study. Basin and streamflow characteristics will be determined for each basin. Continuous long-term precipitation records will be used to synthesize flood events and to extend peak flow records back in time. The optimum equations to compute flood peaks at the desired return intervals will be determined by using all data in a regression analysis.

Stage and precipitation data collection is continuing. Rating of stations and office review of data collected to date continued. Preliminary calibrations of the rainfall-runoff model were obtained for two stations. Results of these were quite encouraging.

Continue data collection program. Continue office review of data collected and computer analysis of data. Continue efforts toward model calibration.

The project will develop for the Tennessee River system comprehensive procedures which will allow current evaluation and consideration of all essential objectives, such as control, navigation, power production, water quality management, water supply, and recreation. These procedures will increase TVA's capability to appraise system modifications and improve operation of the river and reservoir system.

Upon completion, the methods will become day-to-day tools for TVA's water resource planning and management activities. They will expand presently used decision-making processes by more comprehensive and automated procedures which can respond to the steadily increasing complexity of quantitative and qualitative water resource management and optimize the total benefit of the region's water resources.

The project is divided into three steps. Presently under investigation is Step 1, a case study, which assesses the need for a flow requirement at a chosen site on quantity and economy parameters of the reservoir system. Study duration is one and a half years. This step is almost completed and three major reports describing methodology and results are in preparation. Presently under investigation is Step 2, which calls for analysis of methods and development of a comprehensive plan for system-wide implementation program. Step 2 duration is two years.

SUPPORTED BY U.S. Tennessee Valley Auth.

#### 6.0368, BEECH RIVER WATERSHED PROJECT, TENNESSEE

C.H. SMITH, U.S. Tennessee Valley Auth., Knoxville, Tennessee, see 37902

The Beech River Watershed Project established in 1953 is a demonstration of intensified development of land and water resources integrated with the development of other resources of the area comprising 193,200 acres in Henderson and Deatur Counties in the western part of Tennessee. The project is being carried on in cooperation with the Beech River Watershed Development Authority and State of Tennessee.

Hydrologic measurements began in 1953, to ascertain the effects on the water resources of the watershed and its uses resulting from changes in land cover, land-use patterns, and water management due to improvements in farming systems and the expansion and intensification of forestry programs. This included observations of precipitation, streamflow, both surface and ground water, and suspended sediment to serve as a base in evaluating the effects on hydrologic characteristics of changes in land-use management.

The agricultural phase of the project is concerned with the improvement of land-use in sound farming systems.

The forestry phase is concerned with the expansion and intensification of forestry programs to increase both the timber base and the level of land resource utilization.

In December 1965 construction of a multipurpose water control system was completed for the Beech River watershed consisting of eight reservoirs and 71 miles of stream channel improvement. Hydrologic measurements are being continued to determine the hydraulic performance of the water control system, evaluate flood reductions, determine reservoir sedimentation and channel changes, and provide basic

**Abstract:** An ordinance is given establishing zoning districts--residential, commercial, industrial, and flood plain--within the town of Huntingdon, Tennessee, to relegate compatible uses of land to particular areas.

**Pub.** Oct. 70: 43p., NTIS No. PB-196 746: PC \$3.00 MF \$0.95.  
**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

#### 6.0370, FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE

**L.C. CONN.**, U.S. Dept. of the Interior, Geological Survey, Nashville, Tennessee 37203

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with State and local agencies in Tennessee.

**Purpose:** To determine the effect of urbanization on the volume, magnitude, frequency, and time of concentration of flood flows.

**Methods:** Hydrologic data presently available inside and outside of the county and additional data to be collected will be analyzed. Within a particular stream basin the following will be obtained: 1. Continuous streamflow and synchronized precipitation records at one site in the basin. 2. Continuous recordings of floodflow and concurrent storm precipitation at sites in selected sub-basins and at key points along the principal stream channels. 3. Supplementary surveys of high-water profiles between gaged sites following major flood events. 4. Channel cross-section and bed profile surveys necessary for flood-profile computations. 5. Compilation of necessary basin and urbanization parameters.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 6.0371, INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE

**H.C. WILBEN**, U.S. Dept. of the Interior, Geological Survey, Nashville, Tennessee 37203

Economic design of highway structures relies on sound evaluation of magnitude and frequency of floods. Data are not available to define adequately flood magnitude and frequency on small streams (less than 50 sq. Mi). Moreover, the number of small watersheds is so large that it will never be practical to gage more than a small percentage of them. There is a need to collect and analyze hydrologic data from selected small basins and to define therefrom flood-frequency relations applicable to the design of small-stream drainage structures.

This project is designed to provide data for estimating the magnitude and frequency of peak runoff from small ungaged watersheds. Its advantage over earlier projects with similar goals lies in providing a comparable product in less time.

The project will proceed through three phases: (1) Measure flood runoff and concurrent storm rainfall and compute various basin characteristics at 49 sites, to define the relationship between rainfall and peak flow by using the USGS hydrologic model. The gages will be operated 5-10 years, as required by each watershed; (2) Use the rainfall-peak flow relation and long-term rainfall record to synthesize a long-term flood-frequency relation for each watershed; (3) Extend results

to be surveyed. Rainfall-runoff model calibrations were made for seven stations. Initial results look good. Four stations were discontinued as it became apparent that we could not obtain a stable stage-discharge rating. Replacement sites are anticipated. Routine operation of the remaining gages continued. Long-term daily precipitation data for Nashville, Memphis, and Knoxville have been loaded onto the model file.

Routine data collection will be continued. Simulation of long-term peaks and computations of Log-Pearson frequency curves will begin. Nashville long-term until precipitation data will be picked off & loaded onto the model file. Long-term daily evaporation data will be picked & processed. (Text Abridged)

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 6.0372, URBAN HYDROLOGY STUDY - AUSTIN, TEXAS

**J.W. BOARD**, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

Little data are available to determine the effect of urbanization on runoff. The collection of basic data in urban areas is necessary to provide for the most economic design of hydraulic structures and the delineation of flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas; provide water-quality data for selected areas from water samples collected during runoff events which differ by season and magnitude.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events. Water-quality samples will be collected in selected areas to reflect the relation between water quality, season, and magnitude of peak.

Rainfall, runoff, and quality-water data were collected at all sites during the year. These data are being assembled into open-file annual basic-data reports.

Compilation and analysis of basic data will continue and annual basic-data reports will be published.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 6.0373, URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN

**J.D. BOHN**, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

Little data are available to determine the effect of urbanization on runoff. The collection of basic data in urban areas is necessary to provide for the most economical design of hydraulic structures and the delineation of flood hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood hazard areas; provide water quality data for selected areas from water samples

by unusual flood events. Water-quality samples will be collected in selected areas to reflect the relation between water quality, season, and magnitude of peak.

Rainfall, runoff, and quality-water data were collected at all sites during the year. These data are being assembled into open-file annual basic-data reports. A study is currently underway to analyze 5 years of peak data from 28 gaged drainage basins in the Houston metropolitan area. A peak discharge multiple regression prediction equation has been obtained for each basin using independent variables, precipitation duration, and an index of soil moisture. Prediction equations for the 28 gaged drainage basins had a standard error of estimate of 9 to 63 percent, with the average being 29 percent. Sixty years of local rainfall data have been applied to each of the prediction equations to obtain 60 years of peak-flow data. The peak-flow data have been related to various basin parameters to determine their effect on the magnitude of peak. Preliminary results show a range in standard error of estimate of 15 to 25 percent.

Compilation and analysis of basic data will continue and annual basic-data reports will be published. Special studies in two metropolitan areas (Dallas and Austin) will be made to quantify the effects of urbanization on flood peaks and volumes.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0374, EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA

G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

Abstract: The effects of urbanization on flood characteristics of streams in the Dallas metropolitan area were studied by use of a digital model of the hydrologic system, which was calibrated by using observed data from 19 storms in six basins to estimate peak discharges and flood volumes and to simulate a 57-year record of annual peak discharges in 14 basins. The flood-frequency characteristics were defined by fitting the simulated 57-year record to a Log-Pearson Type III distribution. The data indicate that in a fully developed residential area, with a 37 percent impervious area, the average annual direct runoff is about double that of an undeveloped area.

Pub. Jan. 74: 57p., NTIS No. PB-230 188/5: PC \$3.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0375, HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS

V.H. GOINES, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Texas and the Soil Conservation Service.

Purpose: To determine the effects of temporary storage in small flood-detention structures, and of land-treatment measures on the water yield to major water-conservation reservoirs and to provide data which can be utilized in the design of future structures, and in checking the performance of existing structures.

Methods: Rainfall and runoff records are being collected at 1

adjacent basins will be used as currently being collected in the small watersheds. In basins where no flood-detention structures have been built, detailed hydrologic data are available for several years, and by continuing the data collection program, the analysis before and after construction development will be facilitated.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0376, EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA

S.L. JOHNSON, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

Abstract: Rainfall and runoff data from drainage basins in the Houston metropolitan area and a 60-year rainfall record from the National Weather Service Station, Houston-Clear Lake, were used to simulate 60 annual flood peaks at 26 sites. The frequency characteristics, based on these simulated peaks, are related to drainage area and percentage impervious area. These relations, which may be used to estimate the flood characteristics at ungaged sites, indicate that in the Houston metropolitan area, complete urbanization increases the magnitude of a 2-year flood nine times and increases the magnitude of a 50-year flood five times.

Pub. Apr. 73: 56p., NTIS No. PB-220 751/2: PC \$3.75 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0377, URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with the State of Texas.

Purpose: To provide data for a logical approach to flood-control and flood-protection problems, and to analyze the effects of progressive urbanization on the runoff. Data will also be useful in design of storm sewers, culverts, and bridges.

Methods: An adequate sampling will be made of runoff with respect to flood discharge as affected by time, variation in rainfall through climatic cycles, size of area, and degree of urbanization of area. This sampling will be accomplished by installation of streamflow stations, crest-stage stations, and rain gages at appropriate locations. The instrumentations will be done on pairs of small drainage basins within the metropolitan area. One basin of a pair will be developed to represent urbanized conditions; the other will represent undeveloped conditions. Insofar as possible, the basins will be chosen so that the other factors such as geology, topography, and size will be equal.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0378, TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING

L.R. BEARD, Univ. of Texas, Ctr. Res. in Water Resources, Austin, Texas 78712 (C-5340-X)

The occurrence of unexpected trends and events in water resources variables has seriously impacted on the success of the projects. To the extent that these are unpredictable, alternative possible projections must be developed.

teristics of that variable. A number of variables where extensive data on past trends are available will be chosen for special study. A large number of records for each of these variables will be studied to determine trend functions, stochastic characteristics and the nature and frequency of extreme events that do not conform to the mathematical functions employed. Mathematical models will be developed for generating representative sets of projections. Means will be devised for incorporating unexpected departures from mathematical functions in projections to the extent that these are observed in records of the phenomenon. Each projection in a set will represent a specified proportion of all future possibilities.

As a special activity under this project, studies will be made to formulate comprehensive procedures that can be used in virtually all regions by all agencies for estimating flood peak flow probabilities with a relatively high degree of reliability and uniformity. The resulting technical manual is intended to fill a critical technology gap until such time as a more comprehensive flood frequency research and development project is possible.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

**6.0379, WATER FOR TEXAS - URBAN WATER RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV)**

UNKNOWN, Texas A & M University System, Water Resources Institute, College Station, Texas 77843

Abstract: The theme of the 16th Annual Conference on Water for Texas was urban water resources planning and management. Among the topics discussed are: perspectives in urban water management, systems description for urban water resources, conjunctive use of surface and ground water in urban water supplies, hydrometeorology for urban runoff systems, flood plain planning in urban areas, socio-economic aspects of urban water planning, environmental enhancement and recreation, costs of water reuse, river basin quality simulation, Bureau of Reclamation programs related to urban water resources and comprehensive inter-basin planning and inter-governmental coordination. Most papers use examples in Texas, especially the San Antonio area.

Pub. Sep. 71: 182., NTIS No. PB-210 325: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0380, OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY**

UNKNOWN, U.S. Coastal Bend Reg. Comm., Corpus Christi, Texas

Abstract: There are many factors which should influence any plan for development of Oso Creek. Flood control measures may be proposed for the Oso by the Corps of Engineers, Nueces County Drainage District No. 2, and the Nueces County Development Group. When agreement is reached concerning coordination of flood prevention and control for the upper Oso, then consideration must be given to the development plans for the entire Oso Creek basin. Existing and potential urban-industrial, extractive and agricultural contaminants must be identified and dealt with, i.e. sewage,

Creek will play in the development of Nueces County and the Region.

Pub. Mar. 71: 13p., NTIS No. PB-201 213: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0381, SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS**

UNKNOWN, Texoma Regional Planning Comm., Denison, Texas 75020

Abstract: The inventory includes basic data that show the kind of soil, slope, erosion and land use characteristics in Cooke, Grayson and Fannin Counties. The land use classifications are separated into cropland, pastureland, rangeland, forest and woodland and 'other'. The acreages needing treatment in the various classification are described and the treatment that is feasible for this particular soil deficiency is outlined. Forest and woodlands needing establishment, improvement, protection or windbreaks are also described. All watersheds are delineated showing the problems with flooding and conservation of water along with project actions required to solve these problems.

Pub. Aug. 70: 57., NTIS No. PB-195 447: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**6.0382, URBAN HYDROLOGY STUDY, DALLAS, TEXAS**

G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Survey, Fort Worth, Texas 76115

Purpose: To define in Five Mile, Cedar, and Coombs Creek watersheds which would be inundated by past floods of defined frequency. To collect basic hydrologic data on floods of greater-than-ordinary magnitude in these watersheds and White Rock, Barkman, and Joes watersheds. To determine the effects of urban development on flood flows and total runoff in the White Rock Creek area.

Methods: The three major objectives of this project are interrelated to the extent that all hydrologic data collected will be applicable to each objective. Hydrologic instruments and surveys associated with the long-range program will provide the necessary data to define areas inundated by specific floods and to evaluate the effects of urban development on runoff. The data, analyses and computation associated with the short-term phase of the project to provide interpretive information on areas which would be inundated by floods of selected frequency will be applicable to the other objectives and would be strengthened and substantiated by data collected on floods experienced in the watershed. The data collected on the partly urbanized White Rock Creek watershed will be integrated with that being collected on the adjoining but mostly urbanized Barkman Branch and Joes Creek watersheds and the completely urbanized Turtle Creek watershed for analysis.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0383, URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS**

B.B. HAMPTON, U.S. Dept. of the Interior, Geological Survey, Fort Worth, Texas 76115

6 0384.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events.

Rainfall, runoff, and water-quality data were collected at all sites during the year.

Compilation and analysis of basic data will continue, and annual basic-data reports will be prepared.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0384. URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS**

**B C MASSEY**, U.S. Dept. of the Interior, Geological Survey, Fort Worth, Texas 76115

Little data are available to determine the effect of urbanization on runoff. The collection of basic data in urban areas is necessary to provide for the most economic design of hydraulic structures and the delineation of flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events.

The effects of urbanization of flood characteristics of streams in the Dallas metropolitan area were studied by use of a digital model of the hydrologic system, which was calibrated by using observed data from 19 storms in six basins to estimate peak discharges and flood volumes and to simulate a 57-year record of annual peak discharges in 14 basins. The flood-frequency characteristics were defined by fitting the simulated 57-year record to a Log-Pearson Type III distribution.

The project will be reviewed, some rain gages will be deleted and some relocated. Emphasis will be placed on collecting data from small watersheds.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0385. PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT**

**G L WILLIAMS**, Lockwood Andrews & Newman Inc., Houston, Texas

Abstract: The report summarizes the second phase of the Comprehensive Plan for Palacios, Texas. The goals and objectives determined in the first phase were re-evaluated to establish appropriate guidelines for the basic planning recommendations. The planning period was projected to 1992.

Pub. Apr. 72: 106p., NTIS No. PB-213 189/4; PC \$7.50 MF \$0.95

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

Little data are available to determine the effect of urbanization on runoff and quality of water in gentle sloping areas. The collection of basic data in urban areas of Palacios is necessary to provide for the most economic design of hydraulic structures and the delineation of flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events. Water-quality data for selected areas from watersheds will be collected during runoff events which differ by magnitude.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Field surveys will be run to determine areas flooded by unusual flood events. Water-quality samples will be collected in selected areas to reflect the relation between runoff, season, and magnitude of peak.

Rainfall and runoff data from drainage basins in the Houston Metropolitan Area and a 60-year rainfall record from the National Weather Service Station, Houston City, will be used to simulate 60-annual flood peaks at 26 sites. Selectivity characteristics, based on these simulated annual peaks, related to drainage area and percentage of imperviousness. These relations, which may be used to estimate flood peaks at ungaged sites, indicate that in the Houston Metropolitan Area, complete urbanization increases the magnitude of a 2-year flood nine times and increases the magnitude of a 50-year flood five times.

The projected data collection instrumentation will be completed and an attempt made to collect data which can be readily used in a rainfall-runoff model.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0387. VARIATION OF URBAN RUNOFF WITH INTENSITY OF STORMS - TEXAS**

**D.M. WELLS**, Texas Technological University, Lubbock, Texas 79409

Abstract: A simulation model describes the quantitative regimes of storm water runoff from watersheds. The urban runoff system consists of three subsystems: Precipitation, runoff, and quality. The three subsystems are mathematically modeled using statistical techniques. Major flooding in the State of Texas is associated with short-duration high-intensity convective storms. The model assumes these short-duration precipitation events are random and governed by a probability distribution function. A bivariate log-log distribution function fits the observed rainfall depth-duration relations for Lubbock, Texas. The runoff process is modeled using the British Road Research Laboratory method, which assumes that all runoff is derived from interconnecting watersheds. Rainfall inputs are simulated by the method. The outflow hydrograph is generated by reservoir routing. The total pollutant load is predicted by multiple regression involving the storm characteristics and the antecedent conditions.

Pub. Aug. 71: 161p., NTIS No. PB-204 235; PC \$0.95.

**Objective:** Determine water yield and rates and amounts of storm runoff from agricultural watersheds as affected by: climatic factors, watershed size, land use and treatment, cover conditions, and soils and geology. Develop methods of estimating water yield and storm runoff from ungauged areas, and routing these flows in larger watersheds.

**Approach:** In the Edwards Plateau near Sonora, runoff will be measured at 5 flood detention reservoirs and one gauging station, with drainage areas of 686 to 30,720 acres. Supplemental information regarding cover, geology, soils and ground water conditions, also available, will improve the accuracy of prediction of storm runoff and water yield from ungauged areas.

**Progress:** Rainfall and runoff data for 1968 have been obtained at five floodwater detention structures, and seven unit source watersheds. Annual rainfall was near normal with two storm periods, April 9 and May 8-10, that caused appreciable runoff. Rainfall for April 9 ranged from 3.55 to 4.68 inches and runoff from none to 0.32 inch at Site 12 with 2,801 acres drainage area and 0.34 inch from Site 13 with drainage area of 686 acres. For the May storm period, runoff was from none at any sites to 0.41 inch at Site 12. Apparently dense growth of broomweed on the deep upland soils caused less than average runoff from the near normal rainfall. From the seven years record, decreased runoff with increased size of drainage area is indicated.

**SUPPORTED BY** Texas State Government - Austin

#### 6.0389, URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS

**R.D. STEGER**, U.S. Dept. of the Interior, Geological Survey, San Antonio, Texas

Little data are available to determine the effect of urbanization on runoff. The collection of basic data in urban areas is necessary to provide for the most economic design of hydraulic structures and the delineation of flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage areas; delineate actual floods to determine flood-hazard areas; provide water-quality data for selected areas from water samples collected during runoff events which differ by season and magnitude.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events. Water-quality samples will be collected in selected areas to reflect the relation between water quality, season, and magnitude of peak.

Rainfall, runoff, and quality-water data were collected at all sites during the year. These data are being assembled into open-file annual basic-data reports.

Compilation and analysis of basic data will continue and annual basic-data reports will be published.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 6.0390, DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS ON URBAN AREAS

social factors, the objectives included description and measurement of attitudes, needs and actions related to the decision problem as well as analysis of certain institutional constraints or organizational problems of government agencies affecting the drainage decision process.

Social factors identified related to several areas including flooding experience, awareness and information, level of concern, attitudes about flood management, attitudes toward and knowledge about specific proposals, social participation, aesthetic, leisure and environmental measures and demographic characteristics.

The survey found that home ownership, location of residence, length of residence, higher education and male sex were factors associated with higher awareness.

This work was done as a forerunner to other work dealing with this decision process. The variables identified here are being analyzed further for use in model development.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

#### 6.0391, FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION

**P. WILLIAMS**, U.S. Dept. of Commerce, Natl. Weather Service, Salt Lake City, Utah

**Abstract:** After describing the major characteristics of flash flooding in the Western Region of the United States, information is given on the requirements for effective warning and preparedness programs. There follows an informative presentation of the procedures involved in the forecasting of flash floods. Special attention is given to precipitation associated with cut-off upper lows. Such precipitation can be sufficiently heavy to result in flash flooding over the Intermountain Region.

Pub. Dec. 72: 18p., NTIS No. COM-73-10251: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

#### 6.0392, MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH

**F.K. FIELDS**, U.S. Dept. of the Interior, Geological Survey, Salt Lake City, Utah 84111

The methods currently available to estimate flood frequency characteristics at ungauged sites are inadequate for refined hydraulic design.

To provide improved methods of estimating flood discharges for selected recurrence intervals.

About 70 crest gages will be operated in conjunction with the existing streamflow gaging station network to provide an expanded data base. Meaningful expressions of basin characteristics, significant relative to flood flows, will be sought. Predictive equations will be defined by multiple regression. The expanded data base and basin parameters should yield predictive equations of increased reliability.

The variance of topographic relief map and channel geometry parameters were found to be significantly related to selected recurrence interval floods. About 200 flood peaks on ephemeral streams were selected and tabulated for various statistical analyses.

A multiple-regression analysis of flood-peak data collected prior to October 1973, will be made. This analysis will test various climatic and physiographic parameters for incorpora-

urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events.

Rainfall, runoff, and water-quality data were collected at all sites during the year.

Compilation and analysis of basic data will continue, and annual basic-data reports will be prepared.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0384, URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS

B.C. MASSEY, U.S. Dept. of the Interior, Geological Survey, Fort Worth, Texas 76115

Little data are available to determine the effect of urbanization on runoff. The collection of basic data in urban areas is necessary to provide for the most economic design of hydraulic structures and the delineation of flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Flood-profile data will be collected in requested stream reaches. Field surveys will be run to determine areas flooded by unusual flood events.

The effects of urbanization of flood characteristics of streams in the Dallas metropolitan area were studied by use of a digital model of the hydrologic system, which was calibrated by using observed data from 19 storms in six basins to estimate peak discharges and flood volumes and to simulate a 57-year record of annual peak discharges in 14 basins. The flood-frequency characteristics were defined by fitting the simulated 57-year record to a Log-Pearson Type III distribution.

The project will be reviewed, some rain gages will be deleted and some relocated. Emphasis will be placed on collecting data from small watersheds.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0385, PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT

G.L. WILLIAMS, Lockwood Andrews & Newman Inc., Houston, Texas

Abstract: The report summarizes the second phase of the Comprehensive Plan for Palacios, Texas. The goals and objectives determined in the first phase were re-evaluated to establish appropriate guidelines for the basic planning recommendations. The planning period was projected to 1992.

Pub. Apr. 72: 106p., NTIS No. PB-213 189/4: PC \$7.50 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 6.0386, URBAN HYDROLOGY STUDY - HOUSTON, TEXAS

G.L. JOHNSON, U.S. Dept. of the Interior - Geological Survey,

urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage area; delineate actual floods to determine flood-hazard areas; provide water-quality data for selected areas from collected during runoff events which differ in magnitude.

Drainage basins with different hydrologic characteristics will be instrumented to collect simultaneous rainfall-runoff data. Field surveys will be run to determine areas flooded by unusual flood events. Water-quality samples will be collected in selected areas to reflect the relation between runoff, season, and magnitude of peak.

Rainfall and runoff data from drainage basins in the Houston Metropolitan Area and a 60-year rainfall record from a National Weather Service Station, Houston City Station, will be used to simulate 60-annual flood peaks at 26 sites. Selected hydrologic characteristics, based on these simulated and observed data, related to drainage area and percentage of imperviousness. These relations, which may be used to estimate flood characteristics at ungaged sites, indicate that the projected data collection instrumentation will be used in the Metropolitan Area, complete urbanization increase the magnitude of a 2-year flood nine times and increase the magnitude of a 50-year flood five times.

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#### SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0387, VARIATION OF URBAN RUNOFF CHARACTERISTICS AND INTENSITY OF STORMS - TEXAS

D.M. WELLS, Texas Technological University, Lubbock, Texas 79409

Abstract: A simulation model describes the qualitative regimes of storm water runoff from watersheds. The urban runoff system consists of three subsystems: Precipitation, runoff, and quality. The three subsystems are mathematically modeled using hydrologic and statistical techniques. Major flooding in the Texas Panhandle is associated with short-duration high-intensity convective storms. The model assumes these precipitation events are random and governed by a probability distribution function. A bivariate distribution function fits the observed rainfall data for Lubbock, Texas. The runoff process is modeled using the British Road Research Laboratory method. The outflow hydrograph is generated by reservoir routing. The total pollutant load is estimated by multiple regression involving the storm characteristics and the antecedent conditions.

Pub. Aug. 71: 161p., NTIS No. PB-204 235: PC \$7.50 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.D.

#### 6.0388, RELATION OF CLIMATIC AND HYDROLOGIC CHARACTERISTICS TO STORM RUNOFF IN THE SAN JUAN MOUNTAINS PLATEAU - TEXAS

W.C. HANCOCK, U.S. Dept. of the Interior - Geological Survey,

**Objective:** Determine water yield and rates and amounts of storm runoff from agricultural watersheds as affected by: climatic factors, watershed size, land use and treatment, cover conditions, and soils and geology. Develop methods of estimating water yield and storm runoff from ungauged areas, and routing these flows in larger watersheds.

**Approach:** In the Edwards Plateau near Sonora, runoff will be measured at 5 flood detention reservoirs and one gauging station, with drainage areas of 686 to 30,720 acres. Supplemental information regarding cover, geology, soils and ground water conditions, also available, will improve the accuracy of prediction of storm runoff and water yield from ungauged areas.

**Progress:** Rainfall and runoff data for 1968 have been obtained at five floodwater detention structures, and seven unit source watersheds. Annual rainfall was near normal with two storm periods, April 9 and May 8-10, that caused appreciable runoff. Rainfall for April 9 ranged from 3.55 to 4.68 inches and runoff from none to 0.32 inch at Site 12 with 2,801 acres drainage area and 0.34 inch from Site 13 with drainage area of 686 acres. For the May storm period, runoff was from none at any sites to 0.41 inch at Site 12. Apparently dense growth of broomweed on the deep upland soils caused less than average runoff from the near normal rainfall. From the seven years record, decreased runoff with increased size of drainage area is indicated.

**SUPPORTED BY** Texas State Government - Austin

#### 6.0389, URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS

*R.D. STEGER, U.S. Dept. of the Interior, Geological Survey, San Antonio, Texas*

Little data are available to determine the effect of urbanization on runoff. The collection of basic data in urban areas is necessary to provide for the most economic design of hydraulic structures and the delineation of flood-hazard areas.

Collect hydrologic data for studies to determine the effects of urbanization on flood discharge and total runoff with variation in rainfall patterns, rainfall intensity, and drainage areas; delineate actual floods to determine flood-hazard areas; provide water-quality data for selected areas from water samples collected during runoff events which differ by season and magnitude.

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Rainfall, runoff, and quality-water data were collected at all sites during the year. These data are being assembled into open-file annual basic-data reports.

Compilation and analysis of basic data will continue and annual basic-data reports will be published.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 6.0390, DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS IN URBAN AREAS

social factors, the objectives included description and measurement of attitudes, needs and actions related to the decision problem as well as analysis of certain institutional constraints or organizational problems of government agencies affecting the drainage decision process.

Social factors identified related to several areas including flooding experience, awareness and information, level of concern, attitudes about flood management, attitudes toward and knowledge about specific proposals, social participation, aesthetic, leisure and environmental measures and demographic characteristics.

The survey found that home ownership, location of residence, length of residence, higher education and male sex were factors associated with higher awareness.

This work was done as a forerunner to other work dealing with this decision process. The variables identified here are being analyzed further for use in model development.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

#### 6.0391, FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION

*P. WILLIAMS, U.S. Dept. of Commerce, Natl. Weather Service, Salt Lake City, Utah*

**Abstract:** After describing the major characteristics of flash flooding in the Western Region of the United States, information is given on the requirements for effective warning and preparedness programs. There follows an informative presentation of the procedures involved in the forecasting of flash floods. Special attention is given to precipitation associated with cut-off upper lows. Such precipitation can be sufficiently heavy to result in flash flooding over the Intermountain Region.

Pub. Dec. 72: 18p., NTIS No. COM-73-10251: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

#### 6.0392, MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH

*F.K. FIELDS, U.S. Dept. of the Interior, Geological Survey, Salt Lake City, Utah 84111*

The methods currently available to estimate flood frequency characteristics at ungauged sites are inadequate for refined hydraulic design.

To provide improved methods of estimating flood discharges for selected recurrence intervals.

About 70 crest gages will be operated in conjunction with the existing streamflow gaging station network to provide an expanded data base. Meaningful expressions of basin characteristics, significant relative to flood flows, will be sought. Predictive equations will be defined by multiple regression. The expanded data base and basin parameters should yield predictive equations of increased reliability.

The variance of topographic relief map and channel geometry parameters were found to be significantly related to selected recurrence interval floods. About 200 flood peaks on ephemeral streams were selected and tabulated for various statistical analyses.

A multiple-regression analysis of flood-peak data collected prior to October 1973, will be made. This analysis will test various climatic and physiographic parameters for incorporation



A.O. LIND, Univ. of Vermont, School of Arts, Burlington, Vermont 05401

**Abstract.** The author has identified the following significant results. ERTS-1 imagery showing seasonal lake-level conditions in Lake Champlain can be used to assess shoreline change and flooding extent. MSS bands 6 and 7 provide maximum land-water contrasts and are the most useful for shoreline location. Shoreline changes observed between ERTS coverages of October 10 (low water) and April 7 and 25 (high water) and readily apparent and enlargement of specific scenes by a factor of four provides data which can be transferred to a map base. The unique synoptic view provided by ERTS-1 will make it possible to map shoreline positions occurring at a specific lake stage. Due to present government concerns over abnormally high lake levels, resource management questions have been raised regarding the extent, nature, and occurrence of inundation magnitude of shoreline change, and lake volume change.

Pub. Jun. 73: 11p., NTIS No. E-73-10771: PC \$3.00 MF \$1.45.  
SUPPORTED BY U.S. Natl. Aero. & Space Adm.

#### 6.0394. TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Arlington, Virginia 22209

Identification of lands subject to flooding is necessary for land-use management on flood plains. Accurate delineation on maps, of areas subject to inundation by floods of a given frequency is required-- information on frequency of flood discharges, profiles of water-surface elevations along the channel, and large-scale topographic maps. Information obtained during field surveys is needed for computing water-surface profiles by step-backwater procedures. New techniques of photogrammetry, electronic measurement from aircraft, computation of backwater profiles, and the plotting of maps and cross sections by computer may offer more efficient means of flood-plain delineation.

To evaluate potential flood-mapping techniques, appraise their accuracy in relation to cost for various uses and time frame in which flood-plain maps are of maximum use, and to investigate means to carry out flood-mapping techniques at an accelerated rate.

Investigate and compare available methods of obtaining data required for preparing maps, charts, and interpretive reports associated with identification of flood-prone areas. Determine the range in costs involved in the conventional aerial photography-stereo model approach of obtaining measurements of valley cross sections. Investigate the potential of the laser altimeter in its application to aerial surveying, and the possibility of direct survey from the air without going through the stereo-model plotting process.

A pilot study was made in cooperation with the Topographic Division, USGS, to evaluate potential flood-mapping techniques using photogrammetry. Photography taken at 6,000 feet provided the best resolution. In vertical accuracy tests, 68 percent of the points were within 0.5 foot and 95 percent were within 0.9 foot of correct elevation. A flood-hazard map of Jackson, Mo., was prepared in accordance with requirements of the Department of Housing and Urban Development (HUD) in the flood insurance program.

Expand initial approach of investigations. Analyze accuracy-cost factors of flood-plain mapping, from experience to date.

SUPPORTED BY U.S. Dept. of Interior - Geological

#### 6.0395. SEDIMENT MOVEMENT AND MORPHOLOGY IN THE CENTRAL APPALACHIAN - VIRGINIA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Arlington, Virginia 22209

Sediment, particularly in connection with major rain floods, causes many deaths and millions of dollars damage annually. The destruction results from sedimentation, its movement down hillsides and along stream channels, and its deposition. The prediction of important sediment-related events and the prevention or reduction of damage cannot be possible until systematic, planned sedimentation and geomorphic studies are made.

To derive a basis for predicting the occurrence and magnitude of major sediment movements on hillslopes and in the Central Appalachians and nearby areas, in order to prevent or reduce the customary widespread damage which occurs to man and his property from such movements.

Document and examine the geomorphic and sedimentary features of catastrophic sediment movements such as which resulted in central Virginia from the rains of 1969. Measure and evaluate the extent of erosion, the amount and location of deposition of sediment particles involved, geomorphic characteristics of affected and unaffected hillslopes and valleys, and other features which may aid in attaining the research objectives.

Obtained further field data on channel geometry and material samples. Continued analyzing data on channel geometry. Wrote further portions of first draft of report on same. Results to date show some promise of establishing relationship between flow characteristics at a station and measurable features of the channel, such as channel cross-section and sizes of bed material.

Complete the analysis of the data on hand, obtain additional data as the need arises; draw conclusions; finish first draft of manuscript.

SUPPORTED BY U.S. Dept. of Interior - Geological

#### 6.0396. NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA

D.N. CONTRACTOR, Virginia Polytechnic Institute, Blacksburg, Virginia 24061

**Abstract:** The implicit method of solution of the continuity and momentum equations of flow in open channels was used to study problems of unsteady flow in natural river channels. A computer program was written to obtain solutions along with appropriate boundary conditions. The first problem relates to flood flows in the James River. A storm in 1967 was analyzed and the comparison between computed and measured flows was good. The second problem relates to the study of low flows from Holcomb's Dam in Virginia to Bent Creek, Virginia in the James River. A numerical model these flows showed that the program in solution was unstable. However, when the same program was run in double precision, good agreements were obtained between measured and computed flows. The last problem relates to analysis of waves in a pump-storage reservoir. Data were obtained on flows in Leesville Reservoir, on the Roanoke River, Virginia.

Pub. Sep. 71: 54p., NTIS No. PB-206 305: PC \$3.00 MF \$1.45.

**L.A. SHABMAN**, Virginia Polytechnic Institute, School of Agriculture, Blacksburg, Virginia 24061

The factors influencing the adoption of flood plain regulations within Virginia will be identified. Particular concern will be paid to the way the choice process for these regulations affects, and is affected by, the distribution of economic gains and losses. Analytical steps will include: (1) Survey existing flood plain regulations in Virginia and categorize such policies according to type and socio-economic and physical factors associated with their adoption; (2) Develop tools for analyzing the economic effect of alternative land use controls in the flood plain. These tools will be grounded in relevant economic theory and incorporated in a model adaptable to computerized simulation; (3) Analyze the economic impact of a given number of flood plain regulations for case studies selected from insights gained through Step 1, above; (4) Evaluate the relationship between the economic result and the political choice process for each case study; (5) Develop a series of recommendations for encouraging more effective use of flood plain regulations within Virginia.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 6.0398, FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT

**W.R. WALKER**, Virginia Polytechnic Institute, Water Resources Research Ctr., Blacksburg, Virginia 24061

**Abstract:** Contents: Opportunities and responsibilities of local government; Land use management an economic necessity; Flood plain information reports - what they are and how they are used; Engineering data for sound land use planning; Flood plain information studies applied to local condition; Open space program--opportunity in land use management; Comprehensive flood plain development with TVA; U.S. Geological Survey flood-mapping programs; Fairfax County cooperates; Flood plain management in Wisconsin--a local-state effort; Federal, state, and local cooperation in recreation and flood plain development; Soil Conservation Service programs in urban and rural development.

Pub. Jul. 70: 147p., NTIS No. PB-195 425: HC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel.

#### 6.0399, FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA

**W.R. WALKER**, Virginia Polytechnic Institute, Water Resources Research Ctr., Blacksburg, Virginia 24061

**Abstract:** The study gives a quick review of the national flood problem, a comprehensive review of the problem in Virginia, an identification of various programs which have attempted to ameliorate flood damages, and two major pieces of legislation recommended to be adopted for further progress in flood damage abatement. Floods are too big a problem to be handled piecemeal. Only when we shift from simply reacting to them to actually planning for them can we expect to make headway in reducing flood damage losses. Flood plain occupation in which benefits do not exceed the estimated total costs (direct, indirect, and social) is undesirable, because it causes an eventual net loss to society. Any public policy encouraging submarginal development adds to those losses. Vir-

#### 6.0400, URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY

**P.L. SOULE**, U.S. Dept. of the Interior, Geological Survey, Fairfax, Virginia

Fairfax County is in a period of very rapid suburban and urban development. Much of the county is still rural and there is negligible encroachment onto the flood plains. County officials desire to protect its citizens and industry from flood disasters by regulating encroachment onto the flood hazard areas which are to be delineated as a part of this project. Urbanization is believed to increase the flood peak magnitudes; therefore, the effects of the ultimate urbanization must be considered when the zones of flood hazard are delineated.

To compute flood profiles for floods having recurrence intervals of 25-, 50-, and 100-years and to delineate the areas inundated on large scale topographic maps.

Data collected and analytical studies to be made on effects of urbanization upon floods in that area of the Piedmont physiographic province within 50 miles of Washington, D.C. Regression analysis is used to establish values to certain parameters in equations for computing discharge at any given point for a given recurrence interval flood under conditions of ultimate development. Discharges computed to be utilized in step backwater computations to compute flood profiles. Flood profiles to be used to delineate areas inundated on topographic maps, scale 1" equals 100'.

Final delineation was completed for Giles Run, Little Rocky Run, Elk Horn Run, Wolf Run, Sandy Run, and Pope's Head Creek basins; 59 maps were released to the open file.

Flood plain delineation will be completed for Fairfax County. Project report written.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0401, URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA

**F.P. KAPINOS**, U.S. Dept. of the Interior, Geological Survey, Richmond, Virginia 23220

This research is part of the program of water resources investigations conducted by the U. S. Geological Survey in cooperation with state and local agencies in Virginia.

**Purpose:** To delineate flood hazard areas and provide flood information for use in county regulation of these areas in order to protect citizens and industry from flood disasters.

**Methods:** Existing literature has been reviewed, a hydrologic data collection program established, and available data reduced. Basin parameters (drainage area, stream length, stream slope, lag time, percent basin imperviousness and classification of drainage systems) have been determined. Regression techniques were used to derive an empirical equation for lag time as a function of various length-slope parameters. Primary effects of urbanization have been evaluated.

Flood profile elevations are computed using the standard-step method of backwater computation. The water-surface profile elevations are used to delineate the extent of the flood-hazard areas.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0402, PILOT STUDY OF FLOOD PLAIN MANAGE-

structed to demonstrate how flood damages occur and various means of reducing them. A motion picture film has been prepared for public viewing to illustrate this and brochures are being prepared.

A State-wide survey of potential flood problems has been conducted of all counties and municipalities of more than 500 population. Flood damage reduction planning programs are in progress in several counties which are being assisted and monitored by the principal investigators. Short courses and workshops have been conducted throughout the State for planners, engineers, and governmental leaders.

Because of the impacts that floods create on public health and welfare, this program will continue both in research and extension activities.

SUPPORTED BY Washington State Government - Olympia

#### 6.0403, FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON

J. E. CUMMANS, U.S. Dept. of the Interior, Geological Survey, Tacoma, Washington 98402

Abstract: Nisqually River flood profiles, covering the reach from near the river mouth to river mile 6.4, indicate that the main channel will convey without overflow discharges as large as about 21,000 cubic feet per second; this discharge has a 6-year recurrence interval. The banks in some areas will be overtopped at 25,500 cubic feet per second, which has a 13-year recurrence interval. Determined for six flood-profile stations were areas where overbank flooding first occurs and water-surface profiles of 3.4-year and 100-year floods. Alder and La Grande Reservoirs can reduce the magnitude of lower annual flood peaks downstream to some extent, but insufficient data are available to allow prediction of their effects on very large floods.

Pub. Oct. 73: 17p., NTIS No. PB-230 026/7; PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0404, FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON

J. E. CUMMANS, U.S. Dept. of the Interior, Geological Survey, Tacoma, Washington 98402

Abstract: Flood profiles covering the main stem Skokomish River and reaches of the South and North Forks of the Skokomish River and Vance Creek were developed. The main-stem channel of the Skokomish River will contain flows only as large as 4,650 cubic feet per second downstream from U.S. Highway 101, and the flood plain in this reach is subject to inundation on an average of about 10 days each year. The main-stem channel between U.S. Highway 101 and the junction of the North and South Forks will contain flows as large as 8,900 cubic feet per second; such flows occur nearly every year, and have recurred at least six times during one flood season. Flooding is minimal on the three main tributaries above their confluence at river mile 9.0. Storage and diversion of Cushman Dam No. 2 significantly reduces the magnitude of floods of the North Fork Skokomish River. On the main stem, 50- and 100-year floods are predicted.

Pub. Dec. 73: 24p., NTIS No. PB-231 765/9; PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0405, FLOOD HAZARD INFORMATION - BUFFALO

This report describes the flood potential in Logan County, West Virginia, as it has been affected by the disaster of 26 February 1972. The report contains a summary of information and data compiled previously, and a new topographic and other data compiled since the disaster, resulting from the intense flooding.

Contained in the report are profiles and maps showing the extent and magnitude of probable flooding of Buffalo Creek from its mouth upstream to the middle Fork, a distance of about 16 miles. Based on post-disaster channel conditions, and where, to the extent possible, the emergency debris removal and cleanup undertaken during the first four months after the disaster.

Pub. Apr. 72: 40p., U.S. Army, Corps of Engineers, Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Defense

#### 6.0406, STORM CHARACTERISTICS AND FLOOD FREQUENCY INTENSITY IN WEST VIRGINIA

W. H. DICKERSON, West Va. University, Morgantown, West Virginia 26506

The objectives of this study are to determine the frequency relationship for West Virginia floods for diurnal, seasonal, and topographic characteristics and the occurrence of extreme floods.

Intensity-frequency relationships will be determined for durations of 1 to 24 hours and for the Weather Bureau 24-hour day. Selection of extreme-precipitation events for the data sample will be done by computer search centered around the study of characteristic extreme storms. The results are expected to be useful for delineating areas of homogenous rainfall and for depicting areal variations of flood frequencies for selected periods. Results can be used in the design of structures.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 6.0407, REGIONAL FLOOD-FREQUENCY RELATIONSHIPS (PHASE II)

D. C. CONGER, U.S. Dept. of the Interior, Madison, Wisconsin 53706

The design of any structure within the flood plain requires a knowledge of the magnitude of floods for that particular water course. Phase I of this study (1959-70), flood-frequency relationships have been defined for all size drainage areas and frequencies up to a 25-year flood and from 10 to 100-year flood for drainage areas over 20 square miles. For ten years of record are required to adequately define a 100-year flood for drainage areas under 20 square miles.

With additional data on flood characteristics of streams over the next ten years, the flood-frequency relationships presently defined for flood frequencies for at least a 50-year return period for streams with any size drainage area will be improved.

Continue operation of network of crest-stageing stage-rainfall gages to sample flood flows will be correlated with various characteristics (including geology). Also, recent floods at selected sites will be extended using rainfall-runoff model and long-term rainfall data.

netic tape. Six roving gages were calibrated by the Dawdy Model. One roving gage was relocated and another was reestablished. Two crest-stage gages were discontinued and two new ones established.

One or two old crest-stage gages will be relocated and a few new ones established. Crest gages will continue to be rated and indirect measurements verified with current meter measurements. Additional parameters will be studied to give better regression equations. Data will be prepared for the Dawdy Model. Unit rainfall at 5 minute intervals needs to be prepared for 5 long-term U.S. Weather Bureau Stations. This data will be merged with data from the roving gages to generate new flood frequency curves.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0408, HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN**

*P.A. KAMMERER*, U.S. Dept. of the Interior, Geological Survey, *Madison, Wisconsin* 53706

Many small impoundments are being planned and built in southwestern Wisconsin for recreation and upstream flood and erosion control. Most of the upper reaches of the perennial streams are spring fed and contain trout. Information is needed on the effects of these reservoirs on the hydrologic systems in the basins under consideration, including changes in runoff, ground-water movement, and spring flow. Information is also needed on the effects of the reservoirs on downstream water quality that may affect trout populations.

1. To define and describe the existing hydrologic system and water quality in the basin. 2. To determine the effects of the reservoir and cultural changes brought about by it on the hydrologic system and water quality in the basin.

The study will be conducted in three consecutive phases. The first phase will consist of defining existing physical and hydrologic conditions by mapping geology and land use, and measuring various hydrologic and water quality parameters. The second phase will document changes during the construction period. The final phase will evaluate hydrologic and water-quality changes caused by the reservoir.

Collection and analysis of basic hydrologic data (streamflow, spring flow, precipitation, temperature, and ground-water levels) are continuing. Suspended sediment concentration, suspended sediment and bed material particle size, and quality data are collected at high flows.

Collection of basic hydrologic data and water quality and sediment data at high flows will continue. When construction begins this summer, collection of water quality and sediment data will be intensified to monitor changes caused by construction activities.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0409, FLOOD INUNDATION STUDY, WISCONSIN**

*J.O. SHERMAN*, U.S. Dept. of the Interior, Geological Survey, *Madison, Wisconsin* 53706

**Purpose:** To determine inundation limits for flood discharges so that meaningful zoning ordinances may be formulated.

**Methods:** The priority of areas where flood inundation studies will be conducted is to be determined by potential and/or existing hazard and the availability of topographic and

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0410, WATER RESOURCES POLICY IN WISCONSIN  
VOLUME IV - FLOOD PLAIN MANAGEMENT**

*J.A. KUSLER*, Univ. of Wisconsin, Water Resources Center, *Madison, Wisconsin* 53706

**Abstract:** Two basic issues are considered--the administrative constitutionality of regulations to preserve floodplains as open spaces, and the basic problems in planning and coordination of flood plain management efforts at the state, regional, and local elements. The first is a legal research of case law across the nation. In the second issue concerned review of government flood plain management efforts in the southeastern Wisconsin through literature review, telephone surveys, and field studies. An appendix discusses open space regulations and such regulations.

Pub. 1971: 286p., NTIS No. PB-206 223: PC \$3.00

SUPPORTED BY U.S. Dept. of Interior - O.W.R.

**6.0411, NEW TECHNIQUES FOR DELINEATING FLOOD PLAIN HAZARD ZONES - SOIL SURVEY**

*G.B. LEE*, Univ. of Wisconsin, Water Resources Center, *Madison, Wisconsin* 53706

**Abstract:** Part I describes investigations designed to determine interpretations of detailed soil maps, as a means of delineating flood plain boundaries for regulatory purposes. Part II describes similar studies based on interpretation of aerial photographs. Six Wisconsin sites were studied. Boundaries of floodplains determined by engineering methods were compared with boundaries of 100 year floods can be drawn in by interpretation of detailed soil maps. Results of aerial studies showed that flood plain boundaries could be drawn by interpretation of aerial photographs, in which physiographic features were distinct.

Pub. 1972: 104p., NTIS No. PB-214 325: PC \$3.00

SUPPORTED BY U.S. Dept. of Interior - O.W.R.

**6.0412, REMOTE SENSING FOR RESOURCE MANAGEMENT AND FLOOD PLAIN DELINEATION**

*C.J. MILFRED*, Univ. of Wisconsin, School of Forestry, *Madison, Wisconsin*

**Abstract:** Remote sensing is becoming an extremely important research tool in modern resource management. Water resource managers can use remote sensing to provide supplemental information in regions where data has been hampered by the lack of suitable hydrologic and other resource information. Continued pressure for encroachment and development on flood plains will need for more comprehensive planning based on accurate information about an entire river watershed. With respect to flood plain delineation, remote sensors cannot be used to predict the height of flood. They can provide information to indicate areas that are flooded which should help improve flood prediction on theoretical models. Remote sensors offer a new resource inventory system which can be used to supplement traditional detailed studies and serve as an important source of information in regions where detailed studies are not available. Remote sensors generate a great deal of information; there is danger of accumulating more information than can be used.

Pub. Aug. 72: 18p., NTIS No. PB-195 086: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0413, THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS**

D.A. YANGGEN, Univ. of Wisconsin, Water Resources Center, Madison, Wisconsin 53706

Abstract: The preferred method for establishing flood zones is by means of detailed engineering flood predictions and hydraulic studies; there are situations where such studies will be delayed for a number of years. Rather than leave areas unregulated, such as scattered flood plains used for recreation and agriculture, detailed soil survey information can be used, especially in mature landscapes, to delineate regulatory flood hazard areas. The legal considerations relevant to Wisconsin flood plain zoning, as well as the advantages and limitations of using soils information for establishing flood plains, are identified.

Pub. 1972: 77p., NTIS No. PB-211 324: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**6.0414, FLOOD INVESTIGATIONS IN WYOMING**

H.W. LOWHAM, U.S. Dept. of the Interior, Geological Survey, Cheyenne, Wyoming

The optimal design of highway drainage structures requires a knowledge of the magnitude and frequency of peak discharges expected at a given site. This knowledge may be derived either from data collected at the desired location or from regional analysis of peak-flow characteristics. The paucity of peak-flow data for small drainage basins in Wyoming, particularly for ephemeral streams, restricts the use of presently available regionalization techniques. A network of peak-flow, partial-record sites is needed to supplement the existing network of continuous-record streamflow stations.

The main objective is to obtain sufficient basic hydrologic data to define the magnitude and frequency of floods on a regional basis for the entire state and to publish the interpretative analysis in easily usable form. On request from the cooperator, flood-flow characteristics of streams at specific sites will be determined by studying such factors as: history of past floods; distribution of flow across the flood-plain and main channel; and mean velocities in the main channel and overflow areas.

Available flood data will be analyzed, and sites for crest-stage gages will be selected where they will supplement best the existing network of continuous-record stream-gaging stations. Stage-discharge relations will be defined for each crest-stage site by recording water stage and by making current-meter measurements, indirect measurements of peak flow, or by using the 'step-backwater method.' Basin characteristics that are pertinent in flood-frequency analysis will be determined. Frequency characteristics will be related to basin characteristics by regression analysis. Peak-flow measurements will be made at miscellaneous sites where unusual floods occur.

Modification of the crest-stage gage network was continued in order to intensify data-collection efforts in the plains areas of the state. Four stations were discontinued, three new stations were established, and eight stage-rainfall stations (from project WY 64-011C) were converted to crest-stage stations. Data from all partial-record stations having five or more

letter reports were submitted to the Wyoming Highway Department, supplying them with requested information (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**6.0415, STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING**

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Cheyenne, Wyoming

Optimum design of highway culverts requires knowledge of the magnitude and frequency of peak discharges and volumes expected at a given site. Knowledge of the characteristic shape of flood hydrographs is essential in culvert design if highway embankment storage is to be considered in reducing the peak discharge. Also there is little information available on the diverse climatic and physiographic conditions that govern floods on small drainage areas in Wyoming.

The objectives of the study are to: (1) Define the magnitude and frequency of flood volumes to be expected from small drainage areas in Wyoming. (2) Define the characteristic shape of flood hydrographs in relation to the physical characteristics of the basins. (3) Develop a rational method of accounting for the effect of embankment storage which will be useful in culvert design.

Rainfall and runoff data are collected on 49 drainage basins (under 11 sq. Mi.). Principal instrument on each basin is a stage-rainfall recorder with supplementary recording and nonrecording rain gages on basin perimeters. Stage-discharge relations will be determined; physical characteristics of the basins will be measured and runoff characteristics will be determined from data collected by the gages. Rainfall-peak discharge-volume relations will be determined and discharge and volume frequencies will be developed. Computerized programs will be used for statistical analysis such as multiple regression and for synthesizing runoff by means of rainfall runoff models.

A modification to the infiltration concept of the rainfall-runoff has provided better results in basin-model calibration testing of four stations. The modification, considered applicable to semi-arid areas, considers infiltration throughout a drainage basin as being nonlinear in both distribution and time. A 60-year record of annual peaks and volumes has been synthesized from a 60-year rainfall record at Sheridan, Wyoming.

Data collection will be continued at 24 of the 49 stations. This is the final year of the study and 4 stations are considered to have sufficient data and 25 stations have insufficient data and have been discontinued. Rainfall-runoff basin-model calibration will be continued and long-term runoff records will be synthesized from long-term rainfall records. A final report will be completed.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

## 7. HAIL

### INDIVIDUAL ASSISTANCE

**7.0001, ESTIMATING CROP LOSSES DUE TO HAIL. STATISTICAL SUPPLEMENT TO AGRICULTURAL ECONOMIC REPORT NO. 267**

L.M. BOONE, U.S. Dept. of Agriculture, Economic & Stat. Analysis Div., Washington, District of Columbia 20250

vested acre and as a proportion of annual production, by county and crop in the 10-State sample area; estimated annual hail losses to major crops, by county and per square mile of land in the 10-State sample area; and lists of counties where crop production data were unavailable or inadequate during the study period, 1966-70.

Pub. Sept. 74: 84p., Stat. Sup. to Ag. Economic Rpt. No. 267, U.S. Dept. of AG., ERS, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Agriculture - E.R.S.

## **7.0002, MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE**

L.A. JONES, U.S. Dept. of Agriculture, Farm Production Economics Div., Washington, District of Columbia 20250 (FE3-5-54-00)

**Objective:** Determine farm risks, their causes and economic cost, and methods of dealing with them. Maintain and improve statistical series on crop insurance premiums and indemnities, fire losses, farm accidents, farm property and liability insurance, social security, and workmen's compensation.

**Approach:** Collect data from insurance companies, State and Federal insurance agencies, and farmers on farm insurance coverage, premiums, and indemnities by type of insurance and geographic area. Analyze causes of insurance losses and developments in insurance legislation and insurance policies. Develop information from farm surveys and other sources on farm risks and risk bearing methods.

**Progress:** Crop-hail insurance and Federal crop insurance in 1972 totaled a record \$5.0 billion. Premiums amounted to \$176 million and indemnities \$104 million. Crop-hail insurance companies paid indemnities of \$79 million and the Federal Crop Insurance Corporation paid \$25 million. An analysis of insurance to reimburse farmers and ranchers for production losses due to pesticide bans resulted in a publication. A staff paper, prepared for internal use only, attempted to establish criteria for designating emergency areas and determining individual eligibility for emergency loans.

SUPPORTED BY U.S. Dept. of Agriculture - E.R.S.

## **7.0003, A STUDY OF CROP-HAIL INSURANCE RECORDS FOR NORTHEASTERN COLORADO WITH RESPECT TO THE DESIGN OF THE NATIONAL HAIL EXPERIMENT**

P.T. SCHICKEDANZ, State Water Survey, Urbana, Illinois 61801

**Abstract:** The specific purpose of the proposal was the evaluation of selected statistical tests and experimental designs related to the daily experimental unit in a single area through use of historical crop-hail loss data. This purpose was originally intended to be accomplished by evaluating the sampling requirements for three basic experimental designs utilizing the daily experimental unit and crop insurance data for crop-damage seasons. These designs included: random-experimental, in which days are randomized over a single target area into seeded and non-seeded days with the non-seeded days being the control; random-historical, in which a random choice is made of days to be seeded over a single target area with the historical record being the control; and continuous-historical in which all the hail days over a single target area are seeded with the historical record being the con-

Pub. Nov. 70: 96p., NTIS No. PB-197 644: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

## **7.0004, SOYBEAN PHYSIOLOGY AND MANAGEMENT**

J.J. FORST, Purdue University, Agricultural Experiment Sta., Lafayette, Indiana 47907 (IND01684)

**Objective:** Evaluate certain morphological and physiological responses of field crops to cultural practices and environmental conditions. Examine crop response to environmental hazards that defoliate or damage the crop

**Approach:** Field and/or laboratory studies will be conducted with soybeans. Emphasis will be placed on measuring the effects of deleterious environmental phenomena on crop growth and yield. Defoliation, stem breakage, and stand reduction may be used to simulate natural damage. Measurements of photosynthesis, translocation, crop yield and quality will be emphasized.

**Progress:** A study was initiated to determine the effects of 100% defoliation, and one-half height cut-off treatments applied at six stages of reproductive growth, on Hark and Beeson variety soybeans. Similar experiments were conducted by Iowa and Arkansas researchers to determine how response varied at these locations. This information is desired by the Hail Insurance Industry to determine if one hail loss adjustment chart appears adequate for the main soybean producing areas. All defoliation treatments reduced seed yield, with yield reductions being greater on Hark than Beeson variety at any one growth stage. Seed yield of Hark and Beeson varieties was reduced 83% and 77% from check yields when plants were defoliated at the R8 stage. Yield reductions due to one-half height cut-off treatments were similar to but more variable than those for defoliations applied at comparable growth stages. Date of maturity was delayed slightly by treatments applied at early reproductive stages, whereas treatments applied at later stages caused plants to mature 3 to 6 days earlier than untreated plants. The effect of 0, 25, and 50% stand reduction applied at the 6 trifoliate leafstage and an early reproductive stage was studied in another experiment. Slight, non-significant yield increases were associated with early stand reduction treatments. Seed yields were reduced a maximum of 26% when one-half of the plants were removed at the early reproductive growth stage.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

## **7.0005, ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL**

L. BOONE, Univ. of Nebraska, U.S.D.A. Nat. Resour. Ec. Div., Lincoln, Nebraska 68503 (NRE9-2-28-01)

**Objective:** Analyze crop losses from hail, by crop and by county, for selected regions of the United States; analyze prospective shifts in patterns of agricultural production that might be induced by large scale hail suppression; analyze comparative economics of hail insurance, hail suppression and no protection for selected farm resource situations; and analyze alternative institutional arrangements for organizing, operating and financing operational hail suppression systems.

**Approach:** Estimated crop losses from hail will be derived from long-term insurance loss records and agricultural production statistics. Use linear programming to evaluate the prospective effect of hail suppression upon the relative comparative ad-

State, and by county for a ten-state sample, in hail reduction. Over 70 percent of hail loss involves 6 crops located in 23 States. Land inventories, cropping patterns, and production cost budgets by county, crop, and soil resource group were prepared for Nebraska. These data are basic to analyses of the impact of hail suppression on cropping patterns, comparative producing advantage, and selection of the best means of spreading crop loss risk at the farm level in areas of high hail risk. A field study of organizational, operational, and financial characteristics of existing hail suppression projects has begun. The purpose is to determine the type of project that will best satisfy all parties concerned.

SUPPORTED BY U.S. Dept. of Agriculture - F.R.S.

**7.0006, WEATHER MODIFICATION IN NORTH DAKOTA**  
**W.J. PROMERSBERGER**, North Dakota State University,  
 Agricultural Experiment Sta., Fargo, North Dakota 58103  
 (ND-H-04-018)

**Objective:** Characterize the climatology of hail storms in southwestern North Dakota. Determine whether seeding convective storms causes a reduction in intensity of hail and impact energy of hailstorms and causes changes in other hail parameters in seeded areas as compared with adjacent non-seeded areas, and whether seeding clouds with silver iodide causes a precipitation increase in seeded areas and a possible 'rain shadow' downwind from commercial weather modification areas.

**Approach:** In North Dakota, hail and drought losses amount to about 50% of all Federal Crop Insurance payments for crop losses due to natural hazards. A group of farmers in southwestern North Dakota are seeding storms with silver iodide in an effort to suppress hail. A weather modification firm seeds clouds in the north central part of the state for precipitation increase.

**Progress:** Project has been inactive because of lack of personnel to collect data. The graduate research assistantship assigned to this project has been vacant for over a year. A conference was held with the Institute of Atmospheric Sciences at Rapid City, South Dakota. The results of this conference indicate that this project should be continued. The interest in weather modification in North Dakota is increasing.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

## PUBLIC ASSISTANCE

**7.0007, ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL**

**L.M. BOONE**, U.S. Dept. of Agriculture, Economic Research Service, Washington, District of Columbia

The fund transfer will provide support for the final portion of the third year of the study by the Economic Research Service of the U.S. Department of Agriculture to estimate the economic benefits which may be derived from the application of hail suppression technology to severe convective storms which threaten crops in areas subject to heavy hail damage. During the first year of the study, an estimate of crop losses was made by county for selected regions of the U.S. and county clusters that would be amenable to potential hail suppression activities were determined. During the

with the National Center for Atmospheric Research, native institutional arrangements for organization and financing an operational hail suppression system.  
 SUPPORTED BY U.S. Natl. Science Foundation

**7.0008, STUDIES OF HAIL DATA IN 1970-72**  
**S.A. CHANGNON**, State Water Survey, Urbana, Ill.

**Abstract:** The research effort of the project has concerned continuation of the 1967-79 field network and ensuing analyses, plus studies relating to the initial benefits and economics of hail suppression. (1) types of surface hail and rain data, (2) evaluation of suppression efforts, and (3) continued refinement of recording gage. An unfulfilled goal was to gather data to be used in evaluating the hail detection capabilities of a unique dual wavelength radar system. The project further verified the existence of great areal-spaces of hail. Importantly, this network of hailpads is denser than the prior Illinois networks, providing hailstreaks.

Pub. Dec 72: 42p., NTIS No. PB-228 777/9: \$1.45.

SUPPORTED BY U.S. Natl. Science Foundation

## DISASTER MITIGATION

**7.0009, URBAN GEOLOGY PLAN FOR CALIFORNIA: THE NATURE, MAGNITUDE, & COSTS OF NATURAL HAZARDS & RECOMMENDATIONS FOR MITIGATION (ABBREV)**

**J.T. ALFORE**, State Div. of Mines & Geology, California 95814

**Abstract:** This report recommends loss-reduction measures for 10 geologic problems which collectively threatened \$55 billion loss in California's urban areas by the year 2000. The problems are earthquake shaking, mineral resources to urbanization, landsliding, erosion activity, expansive soils, fault displacement hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of reduction measures, and agencies responsible for their reduction.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

## HAZARD REDUCTION

**7.0010, NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT FOR 1973 - COLORADO**

**J.W. FIOR**, Natl. Center for Atmosph. Res., Boulder, Colorado 80302

Funding for the National Hail Research Experiment for FY 1973, has been accomplished in two increments. The first increment was completed in August 1972, as a

to C-760. This award will provide the second increment, and will complete the funding required for the second field operating summer of NHRE in northeastern Colorado in 1973. This project is being conducted by the National Center for Atmospheric Research (NCAR) as a part of a five-year study of hailstorm microphysics and dynamics with the objective of testing the feasibility of suppressing large hail formation in storms through silver iodide seeding. Research is being accomplished through the participation of seven university groups and the cooperation of five federal agencies. The first field operating summer during May, June, and July 1972, provided 22 hail days. Seeding was conducted on 12 of these days, and on 10 days observations were made on cloud mechanisms using instrumented aircraft, dual wavelength radars, and 600 square mile ground meteorological network. High values of liquid water content in the hail forming areas of the storm were observed by means of an armored T-28 research aircraft. Observations and seeding will be continued during the summer of 1973 to provide additional data.

SUPPORTED BY U.S. Natl. Science Foundation

#### 7.0011, THE NATIONAL HAIL RESEARCH EXPERIMENT SUMMER 1973 SUMMARY REPORT

UNKNOWN, Natl. Center for Atmosph. Res., Boulder, Colorado 80302

Summer 1973 was the second of five planned field research seasons of the National Hail Research Experiment to further our understanding of the physics and dynamics of hailstorms and to test the feasibility of hail suppression.

Valuable new cloud physics data were gathered in 16 vertical penetrations of the sailplane Explorer in the updraft of cumulus congestus and in 27 horizontal penetrations of the armored T-28 aircraft through the core of more severe convective storms. In addition, several multi-aircraft research flights around and under storms contributed new observations on the dynamics of severe storms. Also, the detection of hail has been confirmed and the internal distribution of water substances throughout the life cycle of severe storms was again observed and recorded by 2 dual-wavelength research radars. Dual-Doppler research radars also provided new data on the wind fields in and below storms.

There were 6 declared Hail Days, 2 of which were seeded with airborne silver iodide flares burned in the storm updraft at cloud base.

No significant increase in silver concentration could be detected, from the beginning to the end of each season or from season to season, in the ecological systems monitored in the experimental area.

Pub. Dec. 73: 93p., Natl. Hail Res. Exp. Data Rpt. No. 73/2, NSF, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

#### 7.0012, HAIL AND LIGHTNING - COLORADO

H. WEICKMANN, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302

Technical objective: Develop and employ observational techniques and equipment to determine the dynamics, the physical and meteorological structure, and the mechanisms of the hail producing storms. To investigate the feasibility of in-

Approach: Provide technical direction for the surface observation network of the National Hail Research Experiment (NHRE) and conduct storm dynamics mesoscale research aboard RFF aircraft. Provide technical direction for research efforts associated with Kennedy Space Center lightning suppression by chaff seeding of the northeast Colorado area.

Results of APCL participation in NHRE are reported in 'NOAA Hail Research Project -- Summer 1972 Report,' by B. B. Phillips. Results of APCL direction are reported in 'Phase II of Lightning Control Project,' March 1972, by H. W. Kasemir.

SUPPORTED BY U.S. Dept. of Commerce - NOAA

#### 7.0013, EXTENDED AREA EFFECTS FROM WEATHER MODIFICATION

L.O. GRANT, Colorado State University, School of Meteorology, Fort Collins, Colorado 80521

This grant is the second phase of a three year project to evaluate the reality and magnitude of extended area effects that may result from either planned or unplanned localized weather modification, with a significant emphasis on study directed toward the extra area effects resulting from the National Hail Research Experiment. The societal impact of this research rests not only in the degree of control to be required of planned weather modification at various governmental levels but also in gaining a better understanding of the extent to which society is modifying its larger scale climate through the unintended localized weather effects of metropolitan area weather modification.

SUPPORTED BY U.S. Natl. Science Foundation

#### 7.0014, NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING

UNKNOWN, U.S. Natl. Science Foundation, Washington, D.C. 20550

Abstract: The statement concerns experiments in which silver iodide will be delivered by various means in selected developing hail cells to develop and test the feasibility for modifying hail storms in order to suppress the formation of hail of damaging size. The test area is centered on Pawnee National Grasslands in northeastern Colorado, which comprises parts of Logan, Morgan, and Weld Counties, Colo.; Cheyenne and Kimball Counties, Nebraska; and Crook County, Wyo. The temporary alteration of precipitation patterns in the sparsely settled test area will have a direct impact. The level of silver resulting from the silver seeding is expected to be higher than for other seeding methods. Hazards from rockets and rocket parts are minimized.

Pub. Mar 72: 21p., NTIS No. PB-207 539-F: Price \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

#### 7.0015, DESIGN OF HAIL SUPPRESSION EXPERIMENT IN ILLINOIS

G.M. MORGAN, Univ. of Illinois, School of Librarianship, Urbana, Illinois 61801

This grant provides for the first half of the second year of a study to determine the desirability of a long term experimental design for a hail suppression operation in the State of Illinois, and to so advise the Illinois government and its citizens. The study draws upon data taken in Illinois during the period 1967 to 1972, which includes



SUPPORTED BY U.S. Natl. Science Foundation

**7.0016, THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA**

C.M. SAKAMOTO, U.S. Dept. of Commerce, Natl. Weather Service, Salt Lake City, Utah

**Abstract:** A computer program was developed to provide probabilities for selected number of thunderstorm days in a month and in a year. In addition, probabilities for selected number of hail days in a year were determined. Two distribution models were tested in the analysis: (a) Poisson and (b) negative binomial. The program was applied to five locations in Nevada. Results show that for Nevada, the Poisson distribution fits the monthly thunderstorm days for the months November through April, while the negative binomial fits this variable better from May through October. The negative binomial model also fits the annual thunderstorm days in Nevada. Annual hail days distribution favored the Poisson distribution where the frequency was small. The negative binomial fitted the annual hail days distribution at Ely and Elko. Cumulative probabilities are presented for these variables at the five sites, including Elko, Ely, Las Vegas, Reno, and Winnemucca.

Pub. Apr. 72: 33p., NTIS No. COM-72-10554: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**7.0017, TRACER STUDIES IN THE NATIONAL HAIL RESEARCH EXPERIMENT (NHRE)**

J.A. YOUNG, Battelle Memorial Institute, Richland, Washington 99352

**Description:** Three specific areas have been outlined which can make a substantial contribution to the understanding of severe convective storms. (1) Multiple tracer releases can be very useful in the study of air movements and scavenging within a convective storm. (2) Agl labeled with iodine-129 can be uniquely distinguished from normal Agl by neutron activation analysis, and therefore has a great potential in helping to establish the most desirable location in a hailstorm for seeding to suppress damaging hail. (3) Simultaneous measurements of cosmogenic radionuclides, nuclear weapons produced radionuclides, and radon daughters provide a unique means of studying air and hydrometeor trajectories and the rates and mechanisms of the scavenging of atmospheric aerosols either during nucleation or subsequently.

SUPPORTED BY U.S. Atomic Energy Commission

**7.0018, STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN**

C.E. ANDERSON, Univ. of Wisconsin, School of Natural Sciences, Madison, Wisconsin 53706

This grant provides part of the third year of support for a three year continuing grant CI-31278X to study the dynamics, energetics, and cloud microphysics in hailstorms which are typical of those being studied by the National Hail Research Experiment (NHRE) in Northeastern Colorado. Data from storms in the Madison, Wisconsin area and data from the National Hail Research Experiment will be used to test and develop a suitable two dimensional mathematical model of a hailstorm which would simulate the actual fields of motion, temperature, pressure, precipitation, hailstone formation, and their time dependence as experienced in a typical storm. The

minutes is required to activate seeding them in the proper position beneath the sometimes requires decisions to be made. echo has confirmed that the storm will phase. An initial model has been developed to give reasonably representative results with data available to date. Further refinements will be made as the first year of data from NHRE becomes available for accurate comparison.

SUPPORTED BY U.S. Natl. Science Foundation

**8. HURRICANES****INDIVIDUAL ASSISTANCE****8.0001, THE FEDERAL RESPONSE TO STORM AGNES; A REPORT TO THE SUBCOMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF**

UNKNOWN, U.S. Exec. Office of the President, Preparedness, Washington, District of Columbia

This report covers the activities of the Office of Preparedness and other Federal agencies that were declared major disaster areas by Hurricane Agnes and the ensuing tropical storm. Together in one report the activities of state, local, State, Federal, and voluntary agencies, community services and aiding individuals are the effects of this disaster.

Pub. May 73: 62p., Fed. Disaster Assistance, HUD, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing and Urban Development

**PUBLIC ASSISTANCE****8.0002, COASTAL STORM DAMAGE TO DELAWARE: A REFERENCE TO THE DELMARVA PENINSULA, DELAWARE, MARYLAND, VIRGINIA**

F.J. SWAYE, Univ. of Delaware, School of Public Administration, Delaware 19711

**Objectives:** Recent storm damage along the Delaware coast is the result of both meteorological and human factors. This project will: (1) provide information on the impact of past storms including water levels, wind damage, evacuation patterns, storm tracks and the resulting damage to the natural and human environment; (2) delineate areas with a significant hazard potential; (3) designate those areas with present-day land use; (4) designate those areas with past or proposed development or modification; (5) indicate damage potential as the result of increasing industrialization or recreational use; (6) indicate and recommend actions for limiting the future damage from storms in Delaware.

**How Information will be applied:** This information will be relayed to the Delaware portion of the Atlantic Coastal States purpose of developing coastal zoning policies to minimize damage hazards to be implemented by the

civil defense records, highway department, and historical documents. 2. Compilation of predicted tide heights and a comparison to observed water levels during coastal storms in Delaware Bay, and ocean coast. 3. Map of the coastal areas of Sussex County inundated during maximum high water, March, 1962. 4. Delineation of six primary land uses in the coastal zone of Sussex County, Delaware as shown on the 1954 and 1961 aerial photos.

For additional information pertaining to this project contact Dr. William S. Gaither, Dean, College of Marine Studies, University of Delaware, Newark, Delaware 19711.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0003, EFFECTS OF TROPICAL STORM AGNES ON THE CHESAPEAKE BAY**

*D. CORRELL*, Smithsonian Institution, Washington, District of Columbia 20560

To participate in the preparation of a summary report on the effects of Tropical Storm Agnes on the Chesapeake Bay as well as in the preparation of an appendix to the report.

SUPPORTED BY U.S. Dept. of Defense - Army

**8.0004, FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1974**

*UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

Abstract: The federal plan is the ninth in an annual series developed by the federal coordinator for meteorological services and supporting research in response to section 304 of Public Law 87-843. This plan focuses on the provision of meteorological services that will contribute to the public health, safety and welfare and to the effective use of the environment. The highest priority is being given to additional efforts needed to observe, predict, and provide warnings on severe storms, such as hurricanes and tornadoes.

Pub. Jun. 73: 62p., NTIS No. COM-74-10179/1: PC \$5.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0005, ATLANTIC HURRICANE SEASON OF 1972**

*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service, Miami, Florida

Abstract: A general overview of the 1972 hurricane season in the North Atlantic is presented together with detailed accounts of all named tropical cyclones. The 1972 hurricane season was notable for at least three reasons. First, fewer tropical storms and hurricanes formed in the Atlantic than in any season since 1930. Secondly, in 1972 as in 1971, most of the tropical cyclones developed in temperate latitudes, Agnes being the only one to form in the Tropics. Finally, 1972 will be remembered as the year of record hurricane damage. Hurricane Agnes, following a 700 mile overland excursion after its landfall in northwest Florida, was responsible for the most damaging floods ever recorded. Excessive rains fell in Pennsylvania, Maryland, and Virginia. Property damage in the U.S. attributed to Hurricane Agnes is estimated to be near \$3.1 billion.

Pub. Jan. 73: 12p., NTIS No. COM-73-50496-04-03.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0006, APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION**

Abstract: Hurricane warnings cause people and the predicted path of the cyclone to take action to reduce damage and/or loss of life. Sometimes and their attendant costs are avoidable, since a of the coast is alerted than that which the hurricane affects. Using general population densities and damage costs due to storms, the authors present a game- and decision-theory approach to estimate economic benefits of more accurate prediction. savings to this economic sector for a substantial in 24-hr forecasting accuracies is shown to be million in the first year. A general equation is various combinations of improvement levels, probabilities, percentage of those who protect, and warnings per season.

Pub. Mar. 72: 7p., NTIS No. COM-73-50496-02-0

SUPPORTED BY U.S. Dept. of Transportation -

**8.0007, THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE**

*H.S. SAFFIR*, Unknown Inst. or Indiv. Grant, Miami

Abstract: The study furnishes a professional opinion of the percentage of structural damage caused by Hurricane Camille in Mississippi in August 1969. Results are given of the percentage of tidal storm surge and that caused by or initiated by the hurricane. The report asserts that at least 60 percent of the structural damage was caused by wind action or was initiated by wind action. reference is made to the effects on the Pass Christian-Biloxi coast, information is given on records of previous hurricanes.

Pub. Sep. 72: 77p., NTIS No. COM-73-10229: PC \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0008, EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELER ISLAND CHAIN AND THE EASTERN PORTION OF THE MISSISSIPPI DELTA**

*L.D. WRIGHT*, Louisiana State Univ. Systems, Coastal Science Institute, Baton Rouge, Louisiana 70803

Abstract: Air and ground reconnaissance immediately after the passage of Hurricane Camille disclosed significant changes to the natural landscape of the Breton Island arc and to the eastern portion of the lower Mississippi Delta. Considerable dissection and redeposition of sediments along beach and barrier formations, and total destruction of numerous sections. Trends of redistribution of material strongly reflected the final direction of the induced mass transport of water. In the lower delta, the damage was mainly to marsh vegetation and was a result of high water and surge currents directed almost north to south.

Pub. Feb. 70: 24p., NTIS No. AD-709 427: HC \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Navy

**8.0009, ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORMS ON THE UPPER CHESAPEAKE BAY AND ITS TRIBUTARIES**

*J.R. SCHUBEL*, Johns Hopkins University, Graduate School of Oceanography, Baltimore, Maryland 21218

this period. From 19-25 June 1972 excessive amounts of rain fell throughout much of Virginia, Maryland and Pennsylvania, accompanying the passage of tropical storm Agnes. The flooding that resulted was of record or near record proportions throughout the Chesapeake Bay region. Agnes unquestionably represents a major event in the history of Chesapeake Bay. The purpose of the study is to examine samples taken following the storm to quantify the extent to which such a major event affects the estuary.

Pub. Apr. 71: 111p., NTIS No. COM-71-0  
\$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

8.0010, REGIONAL CODE ENFORCEMENT - HANCOCK,  
HARRISON AND JACKSON COUNTIES, MISSISSIPPI

P. MONTJOY, Coast Code Administration, Gulfport, Mississippi

**Abstract:** The document contains the case history of a project to design, develop, and test a regional code enforcement program in the Mississippi coastal area immediately after the devastation caused by hurricane Camille. The report covers the actual background and events in the establishment of a code, a regional code enforcement agency and the funding of such a program, and presents an evaluation of the success and failures of such a program. Also included is a model approach in developing and implementing a code and a code enforcement program. The project was prepared with the idea that it would be most helpful for other areas of the United States which have multi-governmental jurisdictions that would like to consider a similar program.

Pub. 1972: 95p., NTIS No. PB-212 781/9. PC \$6.75 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

8.0011. GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (AB-BREV)

UNKNOWN, State Res. & Dev. Center, Jackson, Mississippi

**Abstract:** The report includes four publications prepared for the port of Gulfport under EDA funding. They contain a management and operations survey of the Mississippi State Port Authority at Gulfport, growth potentials of the port, a master plan for development of port facilities, and costs of developing Mississippi's coastal waterways and ports. Volumes I-III present overviews of work performed in development of a Gulfport master plan, where one existed even before the hurricane; the port's role in waterborne commerce on the Gulf Coast; and port management methods. The growth potentials and management and operations survey are also included. Role of the port in Mississippi's economy, typical characteristics of small ports and Gulfport's assets and liabilities compared with those of other U.S. ports are discussed.

Pub. Apr. 71: 101p., NTIS No. COM-71-00931: PC \$3.00 MF \$0.95.

8.0012, GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (AB-BREV)

storm damage indicated a need for more lateral strength in buildings, especially masonry structures, and for more adequate design of connections and other details.

Pub. Apr. 70: 158p., NTIS No. AD-707 941: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0015, HURRICANE CELIA REDEVELOPMENT

UNKNOWN, U.S. Coastal Bend Reg. Comm., *Corpus Christi, Texas*

Abstract: The objective of the report is to catalogue a preliminary inventory of priorities and needs for each city, county, and school district within the seven county Hurricane Celia disaster area.

Pub. Oct. 70: 35p., NTIS No. PB-195 171: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 8.0016, MEMORABLE HURRICANES OF THE UNITED STATES SINCE 1973

A.L. SUGG, U.S. Dept. of Commerce, Natl. Weather Service, *Fort Worth, Texas* 76102

Abstract: Hurricanes which have made landfall in the United States or have been near misses are cataloged from 1973 through 1970. A track of each hurricane is given along with atmospheric pressure, wind velocity, damage estimates, and other relevant data.

Pub. Apr. 71: 56p., NTIS No. COM-71-00610: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0017, NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I

A. SACHS, Inst. for Defense Analysis, *Arlington, Virginia* 22202

Abstract: The paper describes a prototype natural disaster operations plan for slowly developing natural disasters such as hurricanes, floods, or forest fires. An investigation was concerned with the emergency operations of local jurisdictions (municipalities or counties) and of the state pertaining to natural disasters. It considered the interactions among these jurisdictions from the initial organization and training phase through mobilization of local forces and evacuation, to eventual return and rehabilitation of the evacuees.

Pub. Jul. 72: 105p., NTIS No. AD-749 032: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### DISASTER MITIGATION

#### 8.0018, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines & Geology, *Sacramento, California* 95814

Abstract: This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970

describes the nature, distribution, and magnitude of the problem, as well as costs and effectiveness of prediction measures, and agencies responsible for reduction measures.

Pub. Jun. 73: 111p., NTIS No. PB-222 447/5: PC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 8.0019, CONCRETE BLOCK REVETMENT, BENEDICT, MARYLAND

J.V. HALL, U.S. Army, Coastal Engin. Res. Center, *Washington, District of Columbia* 20016

Abstract: Although the project has been completed in one year, it has protected the backshore area through winter storms. Figure 9 shows comparative photos of the area before and during construction, at completion, and later. The problem of protecting banks and lower reaches of rivers entering Chesapeake Bay and those of the bay, has always been difficult since most problem areas consist of small parcels of land with cottages in individual ownership. Many owners are unwilling to expend large sums of protection. As a result, relatively low-cost, do-it-yourself method of shore protection is needed. The method outlined herein appears to meet the requirements. This system can be installed by the owner on a do-it-yourself basis at a cost even lower than the contract price for the protection at Friendsville, Tennessee, summer camp.

Pub. Jan. 64: 15p., NTIS No. AD-440 882: HC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0020, NATIONAL HURRICANE OPERATIONS PLAN

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., *Washington, District of Columbia* 20540

Abstract: The report is the 11th edition of the Interdepartmental Plan. It presents the procedures and agreements at the annual Interdepartmental Hurricane Conference and outlines the responsibilities of cooperating agencies. Following a chapter on definitions to facilitate communications, one chapter deals with tropical cyclone forecast information to be furnished by the National Weather Service to the Department of Defense. One chapter is devoted to information on aircraft reconnaissance and another to the joint radar tropical cyclone observing and reporting. Subsequent chapters deal with the collection and dissemination of tropical cyclone reports; the designation of tropical cyclone depressions and cyclones; alternate hurricane warning systems; Atlantic-transfer control master plan and National Service transfer plan; tropical storm surveillance; the deployment of experimental environmental observation equipment; and finally addresses to which special news releases should be sent.

Pub. Jun. 72: 132p., NTIS No. COM-72-11238: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0021, NATIONAL HURRICANE OPERATIONS PLAN, 1974

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., *Washington, District of Columbia* 20540

An Interdepartmental Plan was first issued in 1962

mutual concern related to the Atlantic and Pacific hurricane warning services.

Pub. Jun. 74: 122p., FCM 74-5, U.S. Dept. of Comm., NOAA.  
Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0022, FINAL REPORT OF THE DISASTER SURVEY TEAM ON THE EVENTS OF AGNES**

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

On June 23, 1972, during the widespread floods that accompanied Hurricane Agnes, a disaster survey team was designated by the Administrator of the National Oceanic and Atmospheric Administration to review the effectiveness of NOAA's storm and flood warning services and to gather detailed first-hand information from the communities within the river basins effected by the flood events of Agnes. The field survey was completed by June 30. Since then, several reports concerning the flood disaster have been published, the principal one being 'The Agnes Floods--A Post-Audit of the Effectiveness of the Storm and Flood Warnings System of the National Oceanic and Atmospheric Administration, A Report for the Administrator of NOAA by the National Advisory Committee on Oceans and Atmosphere', November 22, 1972, Washington, D.C. The post-audit report is supported by NOAA's self-examination and self-analysis in this 'Final Report of the Disaster Survey Team on the Events of Agnes,' which was made available October 1972 in prepublication form and is now published as NOAA Natural Disaster Survey Report 73-1.

Pub. Feb. 73: 45p., Natural Disaster Survey Report 73-1, U.S. Dept. of Comm., NOAA.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0023, THE HOMEPORT STORY - AN IMAGINARY CITY GETS READY FOR A HURRICANE**

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

This report presents practical advice on how a community can protect itself against a hurricane. Topics covered include pre-disaster planning, communications, shelter and public safety, and evacuation plans.

Pub. 1971: 22p., NOAA/PA 70028, U.S. Govt. Print. Office, Stock No. 0317-0046, Pc \$0.30.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**8.0024, KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA**

A.J. MEHTA, Univ. of Florida, School of Engineering, Gainesville, Florida 32601

Abstract: Dune barrier erosion and possible breakthrough due to storm and hurricane wave activity is studied near Mosquito Lagoon, in Kennedy Space Center property. The results of a geological as well as hydrodynamic appraisal of the problem area indicate that no inlet has existed across the dune barrier since 500 A.D., and that there is little likelihood of a possible breakthrough inlet remaining open permanently, primarily because the relatively shallow lagoon does not contain enough volume of water to maintain an inlet between the ocean and the lagoon. It is therefore recommended that

Pub. Jun. 73: 66p., NTIS No. N73-33337/9; \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Ad.

**8.0025, BAL. HARBOUR, FLORIDA PARTIAL RESTORATION, BEACH EROSION CONTROL, HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA**

UNKNOWN, U.S. Army, Engineer District, Jacksonville, Florida

Abstract: An 0.85-mile reach of the Dade County Beach Erosion Control and Hurricane Protection Project will be partially restored at Bal Harbour Beach for residential and recreational beach. Project fill would be an ocean borrow pit about 1.5 miles offshore and 10 to -36 to -50 feet. About 1.8 million cubic yards of sand dredged from an ocean borrow pit and placed on a 1/2 mile of beach for restoration of protective assets. There will be some temporary turbidity in the borrow and fill areas during construction. Marine life will be destroyed; however, these areas are expected to become reestablished.

Pub. May 72: 55p., NTIS No. EIS-FL-72-5591-F; \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**8.0026, EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA**

UNKNOWN, Miami Federal Executive Board, 33130

The concept of operations and background information contained in this document is to be incorporated as a part of Part D, Natural Disaster of the Dade County Emergency Operations Plan in 1973. It will become a plan of action for Metropolitan Dade County for hurricane emergencies insofar as the relocation and endangerment of residents of Dade County is concerned.

This plan of operation represents the first phase of a new concept for relocating coastal residents who must leave their homes for safer refuge during hurricane emergencies. Its purpose is to augment, not to replace, existing concepts of public safety when a dangerous storm is about to make a land-fall. Agencies presently responsible for weather warnings and evacuation will also have responsibilities for implementing the emergency refuge plan herewith. The primary objective of the new program incorporated in this plan is to reduce the volume of traffic required for relocation of coastal residents. The length of time required to achieve relocation, and the number of places of emergency refuge for those persons who, for ever reason, still remain in endangered locations. Evacuation routes have been cut off and normal places of refuge can no longer be reached.

Pub. May 73: 48p., No copy info. available.

Abstract provided by FDAA.

SUPPORTED BY No Formal Support Reported

**8.0027, ESTUARINE HYDROLOGY OF TAMPA BAY, FLORIDA**  
C.R. GOODWIN, U.S. Dept. of the Interior, Geological Survey, Tampa, Florida

A comprehensive hydrological investigation of Tampa Bay and its immediate surroundings is necessary to assess the probable effects of a proposed channel dredging project on the interacting hydraulic, chemical and biological systems operating in the bay. Unanswered technical questions concerning possible ground-water contamination, modified flushing and circulation characteristics, and overall environmental impact, as well as operational needs, such as quantity and placement of dredged material, justify this project.

The specific objectives of this study are: (1) bathymetric definition of the bay bottom, (2) determination of depth to bedrock, (3) definition of pollutant sources issuing into the bay and their subsequent distribution, (4) development of a management tool to predict the response of the bay to natural and man-made changes--dredging, filling, floods, hurricanes, etc., (5) determination of optimum channel alignment, quantity of material to be removed, and optimum location and shape of disposal sites.

The following techniques will be used to accomplish the listed objectives: (1) bay bottom mapping by negative-blue aerial photography and radar located sonic soundings, (2) depth to bedrock by low frequency sonar and core borings, (3) pollutant sources by detailed field survey-- pollutant distribution by large scale water sampling program and best available laboratory analysis techniques, (4) a predictive management tool in the form of a digital model of the hydraulics and quality of Tampa Bay--verification by comparison with real data (velocity, elevation, quality), (5) optimum dredge operation and fill placement determined by using model to test all suggestions.

Fourteen tide gages operating; monthly and quarter QW monitoring programs established; Weather Bureau data being received monthly; bottom contour maps under topographic division review; digital model nearing completion of development period; data reports in preparation; 800 miles of depth data collected along ship channel and other areas.

Completion of stage, QW, seismic data reports; preparation of interpretive report; computation of types and quantity of material proposed to be removed from ship channel; completion of digital model; use of model to predict effects of proposed activities.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 8.0028, JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION

UNKNOWN, U.S. Army, Engineer District, Savannah, Georgia 31402

Abstract: The project proposes restoration and periodic nourishment of 27,000 feet of ocean beach and construction of a 1,000 foot rubblestone terminal groin. Environmental impacts include: Restoration and maintenance of ocean beach, stabilization of eroding shoreline, increased nesting sites for loggerhead sea turtles, enhancement of recreational facilities, improved economic prospects, and continued maintenance of island's aesthetics. Adverse environmental effects include: temporary increased water turbidity and disruption of benthic, plankton and nekton communities during construction; after project completion, probable increased mortality rate of young loggerhead sea turtles.

Pub. Aug. 73: 50p., NTIS No. EIS-GA-73-1315-D: PC \$4.50.

SUPPORTED BY U.S. Dept. of Defense - Army

Abstract: The manual states policy, outlines responsibilities and prescribes procedures for providing weather and specialized forecast support to authorized units. AWS/DO is OPR for Volume I, which applies to units. AWS Forms 39 and 39a are prescribed in the manual.

Pub. Oct. 71: 28p., NTIS No. AD-732 263: F001 001 \$0.95

SUPPORTED BY U.S. Dept. of Commerce - NOAA

#### 8.0030, GRAND ISLE, LOUISIANA, AND VICINITY, HURRICANE PROTECTION ASSOCIATED WITH BAYOU LAFOURCHE - LOUISIANA (FRANKLIN AND VICINITY AREA)

UNKNOWN, U.S. Army, Engineer District, New Orleans 70160

Abstract: The report describes the administrative and construction of about 43 miles of exterior levees with associated borrow pits, drainage structures, and appurtenances to provide protection from hurricanes along both banks of Bayou Lafourche from Lake de la Poudre 2 miles south of Golden Meadow, Louisiana. The project is located entirely in Lafourche Parish, Louisiana. Environmental impacts are discussed.

Pub. Sep. 72: 39p., NTIS No. EIS-LA-72-5427-D: F001 001

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0031, NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION

UNKNOWN, U.S. Army, Engineer District, New Orleans 70160

Abstract: The report describes the proposal for protection of the back levees from the City of New Orleans (approximately 36 miles) on the west bank of the Mississippi River, including a new floodgate at Empire and the construction of a new levee from Phoenix to Bohemia (approximately 10 miles) on the east bank. In addition, a barrier levee from Bohemia to 10 miles above the Head of Passes on the west bank of Plaquemines Parish from hurricanes will be built. Drainage capability and roadway are maintained within the project area. Environmental impacts are discussed.

Pub. Aug. 72: 34p., NTIS No. EIS-LA-72-5425-D: F001 001

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0032, LAKE PONTCHARTRAIN, LOUISIANA, VICINITY - HURRICANE PROTECTION PROJECT

UNKNOWN, U.S. Army, Engineer District, New Orleans 70160

Abstract: The project is concerned with construction of levees, and hurricane protective works in the Lake Pontchartrain area, Saint Charles Parishes, Louisiana for the purpose of control and protection of lives and property. Efforts due to construction include destruction of marshland and wildlife habitat.

Pub. Apr. 72: 96p., NTIS No. EIS-LA-72-5174-D: F001 001

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0033, MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA)

UNKNOWN, U.S. Army, Engineer District, New Orleans 70160

stations will be modified, and drainage structures will be modified or replaced to meet increased levee grades. The project will effect a complete closure of the area to be protected. The project is located in St. Mary Parish, Louisiana. Significant environmental impacts in the project area are not anticipated. Other than additional borrow areas, the project will alter the existing terrain only to the extent of raising and strengthening the existing Federal levees, and the construction of 3.5 miles of new levee. The human environment will be enhanced by protection of life and property during hurricane flooding.

Pub. Jan. 73: 66p., NTIS No. EIS-LA-73-0989-F: PC \$5.50 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0034, HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT

UNKNOWN, U.S. Army, New England Division, Waltham, Massachusetts

Abstract: The low portions of Stratford, Connecticut, will be encircled by levees and floodwalls for protection against tidal flooding. No major adverse effects are anticipated. Some temporary or short-term effects to the biological makeup of the area may occur when the control gates are closed during periods of tidal flooding.

Pub. Dec. 71: 36p., NTIS No. PB-204 571-D: PC \$3.00.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0035, OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS

UNKNOWN, U.S. Army, New England Division, Waltham, Massachusetts

Abstract: The project proposes operation and maintenance of the main harbor barrier and dike and its related structures. Environmental impacts include protection to the highly developed commercial, industrial and residential areas from tidal flooding during major coastal storms and hurricanes; serves a protective facility for harbor-based and transient vessels; compressed air jetting which causes some temporary turbidity; rodent control. Rodent control and air jetting could be considered to have possible adverse effects.

Pub. Aug. 73: 37p., NTIS No. EIS-MA-73-1353-F: PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0036, OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS

UNKNOWN, U.S. Army, New England Division, Waltham, Massachusetts

Abstract: The New Bedford Barrier is located on the northwesterly side of Buzzards Bay, 50 miles southerly of Boston, Massachusetts. It extends for a total distance of approximately 3 1/2 miles across the southerly portion of the City of New Bedford and the Town of Fairhaven. The statement concerns the operation and maintenance of the main Harbor Barrier and DiKE and its related structures.

Pub. Jun. 72: 31p., NTIS No. EIS-MA-72-4782-D: PC \$3.75.

SUPPORTED BY U.S. Dept. of Defense - Army

Abstract: Construction is proposed for a earth filled rock protected barrier for protection of the City of New Bedford from hurricane flooding. The impact will be on a blighted area facing a valuable waterfront where manufacturing, open space, and shorefishing facilities could be developed. Construction is restricted, and a temporary adverse impact on the environment during construction would result.

Pub. Jul. 71: 21p., NTIS No. PB-204 571-D: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0038, GALVESTON BAY HURRICANE PROTECTION PROJECT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYESTUFFS (BREV)

W.H. BOBB, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: The primary purpose of this study is the determination of the effects of proposed barrier schemes on tides, currents, salinities, and dyestuff dispersion throughout the bay complex for long-range planners in the Galveston Bay area. Among other things, freshwater inflows, generating plant cooling requirements, surge protection barriers for both normal and extreme conditions. It is presently estimated that barrier regulations and diversion will possibly be accomplished before the final protection plan. Therefore, after the barrier is constructed, and dye dispersion tests to duplicate tests were made for diversions estimated for 1980.

Pub. Jul. 70: 144p., NTIS No. PB-204 571-D: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0039, GALVESTON BAY HURRICANE PROTECTION PROJECT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYESTUFFS

W.H. BOBB, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

Abstract: Hurricane protection barriers for the Galveston Bay area. A separate study of barrier schemes would protect the bay from hurricanes. The plan 2 Gamma barrier crosses the bay at the mouth of the stream. Both schemes provide for the construction of across channels and gated tidal passages to maintain existing tides, currents, salinities, and dyestuff passages are expensive and short-lived. Tests for normal tides were made for the model for pre- and postbarrier conditions. The model for pre- and postbarrier conditions, salinities, and dispersion patterns.

Pub. Jul. 70: 111p., NTIS No. PB-204 571-D: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0040, GALVESTON BAY HURRICANE PROTECTION PROJECT 4 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYESTUFFS

**Abstract:** Design of barriers for protection of all or portions of Galveston Bay against inundation by hurricane surges required the use of hydraulic model studies of the Galveston Bay complex to verify the results of surge routings by analytical methods and to determine the effects of all proposed structures on normal tides and hurricane surge heights upstream and downstream from barrier sites. The Galveston Bay hurricane surge model reproduced the coast from Freeport on the south to High Island on Bolivar Peninsula on the east. The model included an average width of the Gulf of Mexico of about 25 miles, measured normal to the gulf; all of the barrier islands in the bay interior, including its many connecting arms, lakes, and lagoons; and the coastal area within this sector up to a maximum elevation of 20 ft msl; and reproduced normal tides as well as gulf surges created by hurricane forces. The model was of the fixed-bed type molded of concrete to linear scale ratios, model to prototype, of 1:100 vertically and 1:300 horizontally. Automatic tide generators reproduced normal tides and tidal currents throughout the model. Hurricane surges were reproduced by a horizontal-displacement type surge generator. Either of the two major hurricane protection plans tested would provide protection for the area inland from the barrier when the navigation openings were closed.

Pub. Sep. 69: 169p., NTIS No. AD-709 587. HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0041, WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION

C.E. CHATHAM, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** A 1:120-scale model of Monterey Harbor, California, and sufficient offshore area to permit generation of the required test waves was used to investigate the arrangement and design of certain proposed harbor improvements with respect to wave and surge action and to determine current conditions in the navigation entrances to the harbor and its basins. The proposed harbor improvements consisted of (a) enlarging the present harbor by construction of a detached north breakwater, approximately 3350 ft in length, and a companion east breakwater connected to shore and extending approximately 1100 ft seaward, and (b) development of the inner harbor area by constructing moles to form two additional basins for the anchorage of small pleasure craft. A 56-ft-long wave machine and electrical wave height measuring and recording apparatus were utilized in model operation. Base tests were conducted with existing prototype conditions installed in the model. Results of tests involving the various improvement plans were compared with base test results to determine the relative effectiveness of the various plans. An analytical study of long-period sea-energy oscillations in the vicinity of Monterey Bay with respect to the possibility of related response in Monterey Harbor was conducted, and the results of that study are presented in Appendix A.

Pub. Sep. 68: 125p., NTIS No. AD-723 954: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0042, WAVE AND SURGE ACTION, MONTEREY HAR-

**Abstract:** The model study was conducted to determine the adequacy of certain proposed breakwater plans for Monterey Harbor from wave and surge action. In connection with the model study a prototype wave analysis was conducted to determine the characteristics of the waves which occur in the harbor.

Pub. Sep. 49: 76p., NTIS No. AD-756 399: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0043, DISCHARGE CHARACTERISTICS OF PROPOSED HURRICANE BARRIERS, WAREHAM-MARION MONTESE, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION

E.C. MCNAIR, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** Three, 1:25-scale, undistorted models were used to simulate hurricane barriers proposed for the Wareham and Onset Bays in the vicinity of Wareham, Massachusetts. These structures will consist of fill dikes protected by rock faces and toes and intermediate navigation openings at existing navigation openings. Discharge coefficients of the structures and the velocities occurring in the vicinity of the openings were determined for headwater (ocean) and tailwater (river) conditions ranging from 0.0 to 20 ft msl and -10 to 10 ft msl. The Onset Bay barrier, which will have gates to permit partial closure of the navigation opening to increase protection from hurricane surges, was investigated with the gates open and closed.

Pub. Oct. 64: 39p., NTIS No. AD-756 282: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0044, DISCHARGE CHARACTERISTICS OF PROPOSED HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION

G.A. PICKERING, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** The discharge characteristics of the navigation opening (base width of 1500 ft) in the proposed hurricane barrier for the East Passage of Narragansett Bay, Rhode Island, were investigated by means of both section and three-dimensional models. Two section models, reproducing the barrier at scales of 1:50 and 1:150, were used to determine the effect of approach depth, roughness of the barrier, and width of the navigation opening on the discharge characteristics of the structure. A 1:150-scale, undistorted, three-dimensional model was used to determine the discharge characteristics of two weirs, one on both flood and ebb flows, and the effect of the spur dike on flood-flow characteristics. Basic data were presented graphically. An analysis of data was made to determine discharge equations applicable to both steady state flood and ebb flows were developed.

Pub. Apr. 65: 38p., NTIS No. AD-733 847: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 8.0045, GALVESTON BAY HURRICANE SURGE PROTECTION - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABSTRACT)



ricane protection systems for the Galveston Bay, Texas, complex. Results of tests to define head losses associated with key portions of the complex are presented to serve as input to a mathematical model of the Galveston Bay area. Results of tests to define the head losses for normal tides and hurricane surge conditions for the Galveston Harbor Entrance and the barrier beaches associated with Galveston Bay are presented. Development of model structures to allow the effectiveness of two barrier plans (Alpha and Gamma) to be evaluated in a distorted-scale model (1:100 vertically and 1:3000 horizontally) is discussed. Model structures of a 400-ft-wide by -55 ft msl navigation opening for each plan and a gated opening with the top of the gate at plus 5 ft msl were developed.

Pub. Mar. 73: 65p., NTIS No. AD-759 119; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**8.0046, GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)**

*R.A. SAGER, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180*

Abstract: The appendix is one of a series of reports presenting results of a model test program conducted to evaluate two proposed hurricane protection systems for the Galveston Bay, Texas, complex. Development of model structures to allow the effects of two barrier plans (Alpha and Gamma) on normal tide conditions to be evaluated in a distorted-scale model (1:60 vertically and 1:600 horizontally) is discussed. A model structure of a 400-ft-wide by -55 ft msl navigation opening was developed for each plan. Model structures of a total of 108 60-ft-wide tidal passages varying in depth from -10 to -40 ft msl were developed for the Alpha plan and a total of 160 60-ft-wide tidal passages at depths of -6 and -12 ft msl were developed for the Gamma plan.

Pub. Mar. 73: 51p., NTIS No. AD-759 120; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**8.0047, PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES**

*H.B. SIMMONS, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180*

Abstract: The design of barriers for protection of Narragansett Bay against inundation by hurricane surges required use of a comprehensive model to determine the effects of proposed structures on normal tide and hurricane surge heights, current velocities, the salinity regimen of the bay, and the rates of diffusion and flushing of pollutants discharged into the bay. Model tests indicated that barriers should not be located in the central portions of the bay because of excessive buildup of surge heights downstream from such barriers, that a lower bay barrier alone could not satisfy the requirements of the Navy and at the same time afford the desired reductions in surge heights at upstream locations, but that the combination of a gated structure at Fox Point for the protection of Providence with a system of lower bay barriers with ungated openings could satisfy the requirements of the Navy for maximum current velocities and at the same time provide hurricane surge protection throughout the bay system.

**8.0048, EFFECTS ON LAKE PONTCARTRAIN HURRICANE SURGE CONTROL MISSISSIPPI RIVER-GULF OUTLET**

*I.C. TALLANT, U.S. Army, Waterway, Vicksburg, Mississippi 39180*

Abstract: A system of barriers along the eastern end of Lake Pontchartrain as a plan for protecting New Orleans from a model study was conducted to determine barriers and also that of the Mississippi Channel (now under construction). The salinity regimen of Lake Pontchartrain was concluded that: (a) freshwater equal consideration with any plan for salinity regimen of the lake system; (b) structures for Chef Menteur and Rigo adverse effect on salinities and tidal height of the Gulf Outlet Channel to 1. increase salinity in the lake such that be required.

Pub. Nov. 63: 113p., NTIS No. AD-759 121; PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense

**8.0049, THE USE OF GRASSES FOR PROTECTION ALONG THE GULF COAST WITH EMPHASIS ON THE TEXAS COAST**

*T.W. BILHORN, Gulf Univ. Res. Center, Galveston, Texas 77550*

Abstract: The Texas Gulf Coast is the most effective measures because it is the most 1622 miles of coast of the Gulf of Mexico provide significant protection from hurricane-generated waves, but violent storms 15-20 feet above sea level causing significant erosion. The sand does not have a vegetative central protective barrier to storm surge would be a continuous vegetated dune above mean sea level.

Pub. Nov. 71: 67p., NTIS No. AD-759 122; PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense

**8.0050, VIRGINIA BEACH, VIRGINIA HURRICANE SURGE CONTROL AND HURRICANE PROTECTION**

*UNKNOWN, U.S. Army, Engineer District, Norfolk, Virginia*  
Abstract: A hurricane protection and project is proposed, consisting of sheet pile concrete, raising and widening the beach, and construction of a structural barrier of certain non-structural measures.

Pub. Sep. 72: 32p., NTIS No. EIS-VA-72; PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense

**HAZARD REDUCTION**

**8.0051, PRELIMINARY REPORT OF PROJECT II DATA (WAVE FORCES ON STRUCTURES) FOR THE MEXICAN RIVIERA CARLA, GULF OF MEXICO**

*J.M. ARDELL, Univ. of California, San Diego, California*

order to attempt to analyze them using the statistical methods developed by Borgman (1967), and to try to obtain prototype information of the 'lift forces' associated with the formation of eddies. Here the term lift forces refers to the horizontal force normal to the direction of wave advance. The study presented herein is a preliminary attempt to analyze the wave force data measured during Hurricane Carla in 1961.

Pub. Jun. 71: 43p., NTIS No. AD-726 011: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### **8.0052, FURTHER VERIFICATIONS OF AND EXPERIMENTS TO IMPROVE THE MODIFIED HATRACK SCHEME FOR FORECASTING THE MOTION OF TROPICAL CYCLONES**

*S.G. COLGAN*, U.S. Navy, Postgraduate School, Monterey, California 93941

**Abstract:** The modified hatrack (MODHATR) scheme for forecasting tropical cyclone motion consists of a numerical steering component using geostrophic winds derived from Fleet Numerical Weather Central's SR height field to steer the storm center, and a statistical modification component to correct for bias and improve forecast accuracy. MODHATR forecasts from the 1969 and 1970 North Atlantic hurricane seasons are analyzed, and average errors presented and compared to earlier years' results. MODHATR forecasts are shown to be superior on the average to OFFICIAL forecasts, NHC-67, and TYRACK forecast schemes for forecast intervals to 48 hours, with relative accuracy of MODHATR decreasing with time.

Pub. Sep. 71: 57p., NTIS No. AD-734 985: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### **8.0053, TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES**

*R.W. FETT*, U.S. Navy, Environ. Pred. Res. Facility, Monterey, California 93941

**Abstract:** A method to predict 24-hr movement of tropical cyclones using consecutive daily satellite views is described. The method is based on the observation that changes in the location of major structural features of the storm are correlated with changes in the direction of movement of storm centers. Major structural features appear to retain the same relative location with respect to the direction of movement of the storm center. The rotation of features noted in comparing satellite views over a 24-hr period is frequently found to approximate in sense and value the further deflection the storm will take in its track during the following 24 hours. A test evaluation of the method by seven individuals using 31 separate data sets of satellite data produced results significantly better than official 24-hr forecasts.

Pub. Jan. 74: 51p., NTIS No. AD-774 683/1: PC \$3.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### **8.0054, TROPICAL CYCLONE ENERGY TRANSFER**

*P. DERGARABEDIAN*, T R W Incorporated, Redondo Beach, California 90278 (DAHC04-71-C-0025)

mate-mathematical models. Ability to predict quantitatively the effects of human intervention on individual weather systems or the planetary atmosphere essential to defense of united states interests.

The contractor will improve the formulation of an existing tropical cyclone model by more sophisticated treatment of the boundary layer, sea-atmosphere fluxes, thermodynamics, turbulence, and friction. Provision for changes in sea-surface condition and storm movement over land will be made. The model will be coded in optimum form for computer implementation.

Supporting agency address information: Defense Advanced Research Projects Agency, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - D.A.R.P.A.

#### **8.0055, TROPICAL CYCLONES**

*F.E. FENDELL*, T R W Incorporated, Redondo Beach, California 90278

**Abstract:** After a brief summary of salient observational facts about cumulus convection in the tropical ambient and about tropical cyclones, models for the cyclone-scale structure and maintenance of the quasisteady mature stage of a hurricane are presented and evaluated. Principal attention is devoted to the model developed by Riehl and Malkus in the late 1950's, and to the model developed by Carrier in the early 1970's.

Pub. Mar. 73: 179p., NTIS No. AD-757 084: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### **8.0056, THE EFFECTS OF HURRICANE CAMILLE ON INDUSTRY, PUBLIC UTILITIES, AND PUBLIC WORKS OPERATIONS**

*R.H. BLACK*, U R S Systems Corporation, San Mateo, California 94402

**Abstract:** The report describes the results of an investigation and a site inspection of the industry along the Mississippi Gulf Coast following Hurricane Camille. The investigation covered public utilities; selected samples of the manufacturing, chemical processing, and food processing industries; and public works, including debris removal. The major topics covered during the interviews were hurricane plans and preparations, emergency actions during the hurricane, damage inflicted, and restoration activities. The results are examined from the viewpoint of their relationship to civil defense and restoration efforts following a nuclear disaster. Conclusions are drawn that relate to both hurricane and nuclear disasters. Recommendations are made on measures to reduce the effects of such disasters and on subjects warranting further study.

Pub. Mar. 70: 94p., NTIS No. AD-708 568: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Army

#### **8.0057, HURRICANE MODIFICATION**

*R.C. GENTRY*, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2G120144)

**Research/service objective:** To study the structure and energy processes in hurricanes to develop hypotheses for modification of tropical cyclones. To conduct field tests in hurricanes and conduct research on data collected to determine effectiveness of the experiments.

modification experiments. 2) To continue research on and evaluation of previous hurricane modification experiments. 3) To continue research to develop better means of evaluating hurricane modification experiments. 4) To seek better means of modifying hurricanes.

Progress report: Had successful field operations: 1) Cloud Line Seeding 2) Feasibility experiments for inhibiting convection with hydrophilic powders and for inhibiting evaporation from the ocean with a film. 3) Collecting of cloud physics information in tropical clouds. Developed improved model for simulating a hurricane. Obtained improved understanding of the rate and circumstances of energy transfer between the ocean and atmosphere in hurricanes

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0058, TROPICAL METEOROLOGIC PROBLEMS

R.C. GENTRY, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (21350223)

Technical objective: To conduct basic and applied research on hurricanes and other tropical weather phenomena by means of observational, analytical and theoretical studies.

Approach: 1) To continue basic studies for improvement of hurricane modeling techniques. 2) Research on structure and energy processes in hurricanes and other tropical systems. 3) To develop improved techniques for forecasting hurricane motion, formation and intensity. 4) Use research aircraft, satellites and other systems to collect specialized data.

Progress: Much effort has been directed toward analytical studies of hurricanes to improve hurricane modeling techniques. This research supports the improvements of techniques for forecasting hurricane motion, formation and intensity while also complementing the hurricane modification program.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0059, A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS

C.P. JELESNIANSKI, U.S. Dept. of Commerce, Weather Modification Prg. Off., Boulder, Colorado 80302

Abstract: Storm surges are computed numerically with a two-dimensional dynamic surge mode, before and after storm modifications. The driving forces used to generate the surges are derived from wind profiles, used here in two different forms. First, a continuous analytic form is used. Second, tabulated wind values from Doppler wind observations measured at 12,000 ft altitude are used: these winds are incremented at 1 n mile intervals from the storm's center. The resulting computations imply that the peak surge on the open coast is not always monotonically related to the parameter, maximum wind speed of the storm. In fact, with the analytic wind profile, the peak surge may increase or decrease according to the manner in which the other storm parameters are affected by the change in maximum wind speed. From the tabulated wind profiles, it is found that the shape of the wind profile has an effect on the peak surge and is separate from the effects of maximum wind, pressure drop, and size scale.

Pub. May 73: 38P., NTIS No. COM-73-11304/5: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0060, STORM SURGE RESEARCH

F. OSTAPOFF, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C692244)

tain physical processes leading to storm structure. Research/service plan: To assess the present state of storm surge research in the U.S. and to begin a program of research.

SUPPORTED BY U.S. Dept. of Commerce

#### 8.0061, HURRICANE RESEARCH MODELING

S.L. ROSENTHAL, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C692244)

Research/service objective: To develop improved models of hurricanes and other tropical cyclones to be used in studying hurricanes, and in predicting hurricane motion and hurricane intensity.

Research/service plan: 1. To develop hurricane models (symmetric and asymmetric) which include improved cloud physics parameterizations and numerical schemes. To use these models to increase our knowledge of hurricane processes and our ability to predict hurricane intensity.

Progress report: Developed improved parameterizations of cloud physics for the symmetrical hurricane model. Improved numerical schemes used in the asymmetric hurricane model.

SUPPORTED BY U.S. Dept. of Commerce

#### 8.0062, HURRICANE MODELING

S.L. ROSENTHAL, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C692244)

Research/service objective: To develop improved models of hurricanes and other tropical cyclones to be used in studying hurricanes, and in testing hurricane modification hypotheses.

Research/service plan: 1. To develop hurricane models (symmetric and asymmetric) which include improved cloud physics parameterizations and numerical schemes. To use these models to simulate more realistic hurricane modification experiments.

Progress report: Developed improved parameterizations of cloud physics for the symmetrical hurricane model. Improved numerical schemes used in the asymmetric hurricane model. In developing a full 3-dimensional hurricane model.

SUPPORTED BY U.S. Dept. of Commerce

#### 8.0063, HURRICANE-TYPHOON DYNAMICS

M. SCHERER, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C692244)

Research/service objective: Determine outer boundary characteristics of typhoons and develop a new global view of tropical cyclones.

Research/service plan: Composite rawinsonde observations around typhoons, hurricanes and tropical cyclones. actual and relative rectilinear and cylindrical coordinates to the centers of tropical cyclones. Climatological data from new Navy and Asheville generated data to develop a new cyclone prediction scheme to the tropical belt for developing a reasonably good model of cyclone genesis.

SUPPORTED BY U.S. Dept. of Commerce

#### 8.0064, HURRICANE-OCEAN INTERACTIONS

M. SCHERER, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C692244)

Research/service objective: Develop a simple coupled ocean-atmosphere model that will be used to study the dependent behavior of the hurricane and the ocean.

**Research/service plan:** An improved hurricane boundary layer will be developed to study the response of the hurricane to specified oceanic parameters such as surface temperature and wave structure. The boundary layer model will include about 10 layers and utilize exchange coefficients for heat, moisture and momentum that vary with stability, wind shear, and wave geometry. After development of a satisfactory boundary layer model, a simple stratified two-layer ocean model will be developed and allowed to interact with the hurricane.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

#### **8.0065, SEA-AIR INTERACTION LABORATORY OPERATIONS**

**H.B. STEWART**, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (023822143)

**Technical objective:** Development of mathematical models of the energy exchange processes between the ocean and atmosphere for improved understanding and prediction of oceanic and atmospheric conditions.

**Approach:** A major effort involves direct investigation of the diurnal and higher frequency energy exchanges as based on the total heat budget of the ocean mixed layer. Instrumented buoys will be monitored during a three week drift period in the vicinity of Puerto Rico. Laboratory (wind/wave tank) studies will examine the interface processes, specifically very near the surface. Development of instrumentation and field studies of irradiance levels within the ocean, and at and immediately above in the atmosphere will continue. Remote sensing techniques offer considerable potential for rapid surveillance of large ocean areas influenced by tropical and extratropical storms. Measurement of wave heights, energy fluxes, surface water temperatures, etc., will be continued in cooperation with the RFF.

**Progress:** Field tests of the instrumented buoys for the mixed layer project near Puerto Rico have been made, and final checkout of equipment and numerical models for data analyses are nearing completion. Excellent results have been obtained from initial wind/wave tank tests utilizing hydrogen bubbles near the surface as water movement tracers. Radiation measurements at several water depths have proven satisfactory in tests near Bimini, as have remote sensing of the sea surface using the RFF aircraft as platforms.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

#### **8.0066, INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES**

**W.M. GRAY**, Colorado State University, School of Engineering, Fort Collins, Colorado 80521 (263211162)

**Technical objective:** To develop better understanding of the tropical synoptic and meso-scale cloud clusters that are associated with tropical cyclones.

**Approach:** The approach will be similar to that already employed by C.S.U. in their study of tropical meso-scale cloud clusters not associated with tropical storms. Storms will be stratified by intensity, stage of development, movement, etc. Groups of storms will then be studied using satellite picture data in conjunction with rawinsonde data. The compositing technique again will be employed, and the study will concentrate on the Caribbean and Western North Pacific regions where the rawinsonde data are most plentiful.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

The objective of this research is fundamental knowledge by means of observational and modeling studies on the dynamics of cumulus convection, with particular emphasis on the relation of cumulus convection to the (a) general circulation, (b) the tropical cloud cluster, (c) severe weather, (d) the hurricane's eye wall, and (e) the CISK idea of boundary layer frictional forcing. Most of this research will be directed towards answering the dynamic questions required for the successful planning and carrying out of the GATE program in 1974, and to a number of the physical problems concerned with cumulus convection in the general circulation which will be encountered in later GARP research.

**SUPPORTED BY** U.S. Natl. Science Foundation

#### **8.0068, HURRICANE SPAWNED TORNADOES**

**D.J. NOVLAN**, Colorado State University, School of Engineering, Fort Collins, Colorado 80521

**Abstract:** An updated climatology of hurricane tornadoes is presented from information gathered for U.S. cases from 1948-72 and typhoon induced tornadoes over Japan from 1950-71. The paper presents a qualitative tornado genesis model which attempts to demonstrate the crucial importance of large low level vertical wind shear in the genesis mechanism. A forecasting guide is also given. The most important difference between storms which produce tornadoes and those which do not is a very large increase of the vertical shear of the horizontal wind between the surface and 4-5 thousand feet. This averages about 40 knots for the tornado cases, but is much less in the cases which do not produce tornadoes.

Pub. May 73: 64p., NTIS No. COM-73-112963; PC \$5.00 MF \$1.45.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

#### **8.0069, THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION**

**D.J. SHEA**, Colorado State University, School of Engineering, Fort Collins, Colorado 80521

**Abstract:** Observational information from approximately 100 flight missions (533 radial legs) flown into twenty-one hurricanes on forty-one storm days over a thirteen year period by aircraft of the NOAA's Research Flight Facility is used to present a unified view of the structure, dynamics, and variability of the hurricane's inner core region. Most flight missions were made between the 900 and 500 Mb levels. Utilizing this information, a steady state schematic model of the mean flow conditions in the hurricane's inner core region is presented. The variability of the inner core meteorological parameters of wind speed, radius of maximum wind, inner radar radius and equivalent potential temperature is discussed. Wind-pressure acceleration balance information is shown. An estimate of the effect water motion has on the Doppler measured winds is made.

Pub. Apr. 72: 144p., NTIS No. COM-72-10683; PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

#### **8.0070, STATISTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (ABBREV)**

**C.Y. YANG**, Univ. of Delaware, School of Marine Science, Newark, Delaware 18711

8.0071,

MAJO

SUPPORTED BY U.S. Dept. of Defense - Navy

**8.0071, A SURVEY OF AVAILABILITY OF HURRICANE/TYPHOON PACKAGES AND ASSOCIATED DATA**

**A.R. MEALS**, U.S. Air Force, Environ. Tech. Appl. Center, Washington, District of Columbia

**Abstract:** The survey outlines the types and format of data available on tropical cyclones. The emphasis is on data packages assembled for individual storms. A list of sources for currently available packages is provided. In addition, a catalog of data archived at National Climatic Center, Asheville, North Carolina, and a bibliography of long-term tropical storm climatology are provided.

Pub. Jan. 72: 20p., NTIS No. AD-736 451: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Air Force

**8.0072, STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION**

**B.R. BODINE**, U.S. Army, Coastal Engin. Res. Center, Washington, District of Columbia 20016

**Abstract:** A quasi-two-dimensional numerical model for open-coast storm-surge computations is discussed from the standpoint of underlying assumptions, range of validity, calibration, and application. While it is possible to make computations manually, electronic digital calculations are generally preferred. Elementary aspects of hurricanes and the physical factors of storm-generation processes are discussed. The basic hydrodynamic equations are given, together with the assumptions generally made in their development. The equations consistent with the model are reduced forms of the basic equations in which several terms have been neglected. These omissions are indicated, and their effects on the resulting numerical scheme are discussed. The use of design hurricanes for engineering studies is treated. Effects of astronomical tide, initial water level, and atmospheric-pressure setup are considered. A problem is solved for the Chesapeake Bay Entrance by computer and manually. The computer program used is listed.

Pub. May 71: 65p., NTIS No. AD-728 128: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**8.0073, LONG-PERIOD WAVES AND SURGES**

**UNKNOWN**, U.S. Army, Coastal Engin. Res. Center, Washington, District of Columbia 20016

**Purpose of study/investigation:** To gain an improved understanding of the creation, propagation and transformation of long waves; particularly tides, storm and hurricane surges, and tsunamis.

**Approach or plan:** Research and development on long-period waves and surges including theoretical, laboratory, and field studies of surging in harbors; the prediction of changes in tidal currents and heights caused by changes in channels and basins; the prediction of storm surge heights at coastal locations; and the generation, travel, and effects of tsunami

dies on storm surge calculations including gravity waves by Texas A and M University. A mathematical storm surge model for estuaries in Lake Okeechobee was formulated and implemented as a computer program, and Hillsborough Bay storm surge model is being verified by the University of Florida. Three reports pertaining to tsunami studies from the University of California. Studies of long waves by Texas A and M University. Final report and six earlier reports and studies in journals.

SUPPORTED BY U.S. Dept. of Defense

**8.0074, HURRICANE CAMILLE - AUGUST 1969**

**R.D. DIKKERS**, U.S. Dept. of Commerce, Div., Washington, District of Columbia 20540

**Abstract:** One week after Hurricane Camille struck the Mississippi-Louisiana Gulf Coast with 125 mph winds, tides on August 17, 1969, a four-man team surveyed the damage to buildings and other structures. Data on wind speed and storm surge are presented. Suggestions are made pertaining to the improvement of design and construction practices.

Pub. Mar 71: 73p., NTIS No. COM-74-10: PC \$1.45.

SUPPORTED BY U.S. Dept. of Commerce

**8.0075, A TECHNIQUE FOR THE FORECASTING OF TROPICAL CYCLONES FROM SATELLITE PICTURES**

**V.F. DVORAK**, U.S. Dept. of Commerce, Satellite Serv., Washington, District of Columbia 20540

**Abstract:** A technique for using satellite pictures of tropical cyclones is described in detail. The technique is given for detecting changes in cyclone intensity, estimating the magnitude of the intensity, and hour intensity changes. A code for transmission is also described.

Pub. Jun 72: 22p., NTIS No. COM-72-10: PC \$0.95.

SUPPORTED BY U.S. Dept. of Commerce

**8.0076, HURRICANE EFFECTS ON PORT FACILITIES**

**R.D. MARSHALL**, U.S. Dept. of Commerce, Standards, Washington, District of Columbia 20540

**Reasons for starting or progress last year:** U.S. Gulf Coast ports from 1965 to 1970 have cost \$2 million per year for port facilities and improvements. Two of those years was on the order of \$10 million. Improvement of building codes, design criteria, and precautions to reduce hurricane damage to port facilities. Basic data on wind pressure and structural loads are therefore essential to measurements of wind and wind loads on port facilities along the Gulf Coast. Be made and this information as a basis for the design of port facilities.

response measurements during the FY74 hurricane season.

SUPPORTED BY U.S. Dept. of Commerce - Maritime Administration.

**8.0077, DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS**

**H.F. REPS**, U.S. Dept. of Commerce, Center for Building Technology, Washington, District of Columbia 20234

**Abstract:** The report provided technical information regarding characteristics of materials and building systems, and discusses the structural performance of buildings subjected to the action of earthquakes and wind forces with specific reference to structures typical of developing countries. Potential ways are described in which structures can be made more resistant to such action. Siting considerations are discussed from a geological, seismic and climatological viewpoint, and recommendations relating to siting problems are made. Techniques of housing construction, both traditional and industrialized, are described and improvements resulting in better earthquake or windstorm resistance are suggested. Building codes, their improvement and their enforcement are also discussed.

Pub. Jan 74: 153p., NTIS No. Com-74-50184/2: PC-GPO MF \$1.45-NTIS.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

**8.0078, WIND AND SURGE DAMAGE DUE TO HURRICANE CAMILLE**

**H.C. THOM**, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

**Abstract:** Wind speeds along the Gulf Coast during the passage of Hurricane Camille on August 17, 1969, are discussed. The severity of the storm is described in terms of the mean recurrence interval for tide heights at Biloxi, Mississippi. These evaluations of wind and storm surge intensity are then related to the distribution of structural damage in the area bounded by Biloxi and Bay St. Louis. It is concluded that provisions for storm surge should be included in future regional building codes and that good design practice and construction details can substantially reduce wind damage.

Pub. 1971: 9p., NTIS No. COM-72-50573.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

**8.0079, REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965**

**UNKNOWN**, U.S. Dept. of Hou. & Urb. Dev., Fed. Insurance Administration, Washington, District of Columbia 20410

**Abstract:** Although California and Alaska are more vulnerable to earthquakes than other States, all but a few have experienced some earthquake activity. A severe earthquake in a densely populated area could cause heavy loss of life and billions of dollars of property damage. Earthquake insurance is readily available on one to four family dwellings throughout the United States. Earthquake insurance premiums on dwelling properties are neither excessive nor unreasonable. Earthquake insurance on commercial and industrial properties is available, but its availability is limited

Pub. 1971: 120 p., NTIS No. PB - 206 791: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**8.0080, ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME I - 24 HOUR MOVEMENT**

**H.L. CRUTCHER**, U.S. Navy, Weather Service Command, Washington, District of Columbia 20301

**Abstract:** Probabilities relating to the future movement of North Atlantic tropical cyclones are presented. The probabilities are based on observational data of successive 12-hour positions of the centers of these storms. The data are stratified into five seasons (June-July, August, September, October, November-May) and into geographical areas defined by five-degree latitude-longitude squares. The probabilities are computed assuming the initial storm position or 'origin' is always at the center of the square and the target areas are always circular areas with radii of one, two and three degrees latitude which are also located at the center of the squares. These probabilities indicate the chance of the storm center being within the target areas at the end of specified time intervals. Two sets of probabilities are presented for each square: one set for the case when the origin is at the center of the master square, and a second set for the case where the target areas are centered on this square. Values for time intervals of 24 hours, are presented in Volume I.

Pub. Aug. 71: 66p., NTIS No. AD-744 916: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

**8.0081, ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT**

**H.L. CRUTCHER**, U.S. Navy, Weather Service Command, Washington, District of Columbia 20301

**Abstract:** Probabilities relating to the future movement of North Atlantic tropical cyclones are presented. The probabilities are based on observational data of successive 12-hour positions of the centers of these storms. The data are stratified into five seasons (June-July, August, September, October, November-May) and into geographical areas defined by five-degree latitude-longitude squares. The probabilities are computed assuming the initial storm position or 'origin' is always at the center of the square and the target areas are always circular areas with radii of one, two and three degrees latitude which are also located at the center of the squares. These probabilities indicate the change of the storm center being within the target areas at the end of specified time intervals. Two sets of probabilities are presented for each square: one set for the case when the origin is at the center of the master square, and a second set for the case where the target areas are center on this square. Values for time intervals of 48 hours are presented in Volume II.

Pub. Aug. 71: 100p., NTIS No. AD-744 917: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

**8.0082, ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT**

bilities are based on observation data of successive 12-hour positions of the centers of these storms. The data are stratified into five seasons (June-July, August, September, October, November-May) and into geographical areas defined by five-degree latitude-longitude squares. The probabilities are computed assuming the initial storm position or 'origin' is always at the center of the square and the target areas are always circular areas with radii of one, two and three degrees latitude which are also located at the center of the squares. These probabilities indicate the chance of the storm center being within the target areas at the end of specified time intervals. Two sets of probabilities are presented for each square: one set for the case when the origin is at the center of the master square, and a second set for the case where the target areas are centered on this square. Values for time intervals of 72 hours are presented in Volume III.

Pub. Aug. 71. 121p., NTIS No. AD-744 918; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

### 8.0083, HURRICANE PREPAREDNESS AND CONTROL PLAN

UNKNOWN, U.S. Natl. Aero. & Space Adm., John F. Kennedy Space Center, *Cocoa Beach, Florida*

Abstract: This plan establishes policy and sets forth guidance, responsibilities and procedures utilized by Federal Electric Corp., communications department in support of the KSC Emergency Preparedness Plan, Annex A, Hurricane Control Plan (GP-355) dated 27 May 1971. This plan covers all FEC communications department personnel, facilities, and equipment situated at the Kennedy Space Center that are the responsibility of FEC contract NAS 10-4967.

Pub. May 72: 53p., NTIS No. N72-32605; PC \$4.75 MF \$0.95.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

### 8.0084, ATLANTIC TROPICAL SYSTEMS OF 1972

N.L. FRANK, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida* 33124

Abstract: The 1972 hurricane season produced 113 'seedlings' of which 24 acquired the closed circulation of a depression. This was the largest number of tropical systems observed since the National Hurricane Center began keeping records in 1968. The reason for this high number was the unusual development of many subtropical cyclones in temperate latitudes. Details are given on the census of 1972 tropical storms and a comparison with other years is made. During the 5 year period 1967-71, approximately 75% of the named storms and depressions were initiated by seedlings of the tropical type and only 25% by baroclinic seedlings. The opposite was true in 1972 with 75% of the depressions and storms spawned by the baroclinic seedlings. In a normal year, African systems initiated approximately half of the Atlantic storms and depressions. In 1972, however, only one storm (Dawn) and only six of the 24 depressions came from this source.

Pub. Feb. 73: 6p., NTIS No. COM-73-50496-04-04.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 8.0085, HURRICANE DEBBIE MODIFICATION EXPERIMENTS, AUGUST 1969

R.C. GENTRY, U.S. Dept. of Commerce, Natl. Hurricane Res. Lab., *Miami, Florida* 33124

intervals on both 18 and 20 August. Before the first on 18 August, the maximum speed of winds at 3600 was 182 kilometers per hour, but, 5 hours after seeding, these winds decreased to 126 kilometers per hour. On 20 August, the corresponding change was from 156 kilometers per hour. Analyses of the data suggest the storm was modified.

Pub. 1970: 5p., NTIS No. AD-722 991; Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 8.0086, COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY

J.R. HOPE, U.S. Dept. of Commerce, Natl. Weather Service, *Miami, Florida*

Abstract: Tropical cyclone advisories and bulletins for the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico are issued or coordinated through the National Hurricane Center of the National Weather Service. Relevant to this report is the maintenance of suitable documentation of tropical cyclone tracks. Such data are stored on magnetic tape and can be instantly processed by a digital computer. With the data now stored on tape, the National Hurricane Center, using fully computerized methods, has the capability of quickly consulting the climatology of areas of any such portions of the hurricane season as may be pertinent to a particular forecast problem or for long-range planning purposes. The HURRAN technique, an analog process routinely used as a basic forecast aid, is discussed.

Pub. 1971: 8p., NTIS No. COM-71-90037-05-2.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 8.0087, OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST)

B.R. JARVINEN, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida* 33124

Objective: To give the hurricane forecaster objectively analyzed sea surface temperature and anomaly charts in real time for 3-day, 10-day, and 30-day periods during the 1974 hurricane season.

Current status: Results from the hurricane season of 1973 indicate that the objective analysis of the SST and identification of anomalies can give the hurricane forecaster regions in which a tropical cyclone can form and the warm SST which can be sources of energy for intensification.

Plan for FY-74: The objective analysis of the SST will be done on an operational basis for 3-day, 10-day, and 30-day periods.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 8.0088, CIRCULATION FEATURES OF TROPICAL CYCLONES

B.R. JARVINEN, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida* 33124

Objective: To compute several dynamic quantities so that the hurricane forecaster will be better able to determine the development potential of a tropical cyclone.

Current status: Objective analysis of the ATOLL (and the Tropical Oceanic Lower Layer) and 200 millibar wind enable the computation of the following in real time: 1) ATOLL and 200Mb vorticity and divergence. 2) ATOLL and 200Mb vorticity advection. 3) At selected points

ATOLL and 200Mb. a) Line integrals of the radial wind. b) Line integrals of the tangential wind. c) Flux of angular momentum. 4) Tendencies of the various quantities listed in 1, 2, and 3. These quantities can be computed twice daily depending on availability of computer time.

Plans for FY-74: These quantities will be computed twice daily when requested by the hurricane forecaster.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0089, PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL

*B.I. MILLER*, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida 33124*

Objective: To improve the prediction of hurricane tracks, development, and rainfall associated with tropical weather systems by the application of a limited-area fine-mesh primitive-equation model.

Current status: Model has reached the stage where a few quasi-operational forecasts may be made during the 1973 hurricane season.

Plans for FY-74: Evaluate the results of the forecasts made during the 1973 hurricane season. Collaborate with NMC in the development of First Generation Model to be tested in 1974.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0090, GRAPHICAL DISPLAY OF HURRICANE FORECASTS

*C.J. NAUMANN*, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida 33124*

Objective: Develop a series of programs for the NMC VARIAN computer system to assist the hurricane forecaster in the mechanics of constructing a forecast hurricane track and keeping the track within the bounds of the 50 percent probability ellipses.

Current status: A program has been written for both the CDC 6600 and the NMC VARIAN computers to graphically display hourly forecast position and motion given the following initial conditions: (1) Starting latitude and longitude. (2) Two or more additional anchor points without regard to time. (3) A forecast storm speed at one or more of the standard forecast times. (4) Elliptical data.

Plans for FY-74: To develop additional programs for the VARIAN computer. Such programs will be designed to assist the hurricane forecaster in the mechanics of issuing and monitoring all aspects of the hurricane forecast problem.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0091, STATISTICAL-DYNAMICAL PREDICTION OF HURRICANE TRACKS

*C.J. NEUMANN*, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida 33124*

Objective: To improve current statistical displacement forecasts using predictors derived from prognostic charts produced by NMC.

Current status: Using the so called 'perfect-prog' approach, fifty-two sets of statistical prediction equations have been developed for the Atlantic area tropical cyclone belt. Input data consists of the usual persistence and climatological data plus predictors derived from the current 1000, 700 and 500Mb analyses and the PE 24, 36 and 48 forecasts of the 500Mb level.

progs will be accomplished by introducing random errors (using Monte Carlo techniques) to the observed 'perfect-prog' data. In this way it is believed the screening regression program will assign more realistic weights to the prognostic data.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0092, ERROR ANALYSIS OF HURRICANE FORECASTS

*J.M. PELISSIER*, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida 33124*

Objective: To provide the hurricane forecaster with some objective means of evaluating the expected errors of the various prediction systems in operational use at NHC.

Current status: The errors of the four statistical tropical cyclone prediction systems in operational use at NHC (HUR-RAN, CLIPER, NHC67 and NHC73) have been found to be a function of the storm's initial U and V components of motion and its current position. This function has been approximated by a second-order polynomial fitted to the dependent data errors of least squares techniques.

FY-74 Plans: Complete the system of equations described above and extend the error analysis to the SANBAR barotropic model. Explore the feasibility of using Monte Carlo methods to extend the error analysis to independent data.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0093, BAROTROPIC PREDICTION OF HURRICANE TRACKS

*A.C. PIKE*, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida 33124*

Objective: Accurate prediction of tropical storm and hurricane tracks to three days with a filtered barotropic model. Initial data are winds averaged with respect to mass through the troposphere.

Current status: A careful initial analysis technique insures that each storm begins to move with an observationally specified direction and speed. With this method the model performs, on the average, at least as well as the official forecasts.

Plans for FY-74: Time-dependent boundary conditions will be tested. The initial analysis will be further refined. More satellite wind data will be incorporated.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0094, LANDFALL ERRORS IN HURRICANE FORECASTS

*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Hurricane Center, *Miami, Florida 33124*

Objective: To enable the hurricane forecaster to determine in real time which of the statistical and numerical models is performing the best by application of Bayesian statistics.

Current status: The landfall program has been programmed to run on the 6600 computer and the VARIAN computer at NMC.

Plans for FY-74: Program will be run whenever a tropical storm or hurricane exists.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0095, PROJECT STORMFURY ANNUAL REPORT 1971 UNKNOWN, U.S. Dept. of Commerce, Natl. Hurricane Res. Lab., *Miami, Florida 33124*

Abstract: Extensive sea temperature and bathythermograph



Pub. Jun. 72: 185p., NTIS No. COM-73-10277: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

#### 8.0096, HURRICANE MODIFICATION BY CLOUD SEEDING

M.A. ESTOQUE, Univ. of Miami, School of Marine Science, Miami, Florida 33149

Abstract: A theoretical model which is suitable for studying the effects of artificial cloud seeding on hurricanes is described. The model is based on the time-dependent, nonlinear, and axially symmetric primitive equations. It incorporates the effects of cloud microphysical processes and predicts explicitly the distribution of water in clouds and in precipitation. Artificial seeding is simulated in the model by freezing a specified percentage of the total liquid water content and then releasing the heat of fusion. Results of seedings at three different radial locations are discussed. Seeding produces an intensification of the storm in the earlier stages; but, subsequently, the seeded hurricane becomes weaker than the unseeded one. The largest modification occurs when seeding is nearest the eyewall.

Pub. Feb. 72: 39p., NTIS No. COM-72-10856: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0097, GIANT WAVES HIT HAWAII

J. BOTTOMS, U.S. Dept. of Commerce, Natl. Weather Service, Honolulu, Hawaii 96812

Abstract: The report describes the successful prediction of the arrival time of storm-generated heavy waves in Hawaii during early December 1969.

Pub. Sep. 70: 46p., NTIS No. COM-71-00021: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0098, USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES

T. MURAKAMI, Univ. of Hawaii, School of Arts, Honolulu, Hawaii 96822 (263211413)

Objective: To improve understanding of large-scale tropical disturbances through theoretical and synoptic studies using meteorological satellite data.

Approach: A diagnostic model for the study of large-scale waves in a conditionally unstable tropical atmosphere has been developed. This model is an improved version of an earlier one and now includes a divergent wind component as well as frictional effects in the planetary boundary layer which play a dominant role in enhancing Rossby waves in the equatorial stratosphere. The model will be used to study many types of tropical disturbances and their relation to the large-scale circulation. This will include a study of the relation between fluctuations in monsoon rainfall and the strength of the jet stream. In addition, the relation between ocean temperatures and tropical convection and circulation will be examined. A parallel study will simulate the planetary-scale stratospheric temperature changes described by Fritz and Soules.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0099, THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES

T. MURAKAMI, Univ. of Hawaii, School of Arts, Honolulu,

mosphere. The following topics will be addressed: (a) the effect of large-scale disturbances in a conditionally unstable tropical atmosphere. The following problems will be addressed: (a) the effect of the instability curve changes as a function of the divergent meridional wind; (b) sensitivity of structural waves in a free atmosphere due to a divergent meridional wind component; (c) wind and pressure perturbation in the boundary layer. 2. Numerical experiments of large-scale disturbances forced by diabatic heating. The following topics will be addressed: (a) the effect of large-scale disturbances as indicated by their growth rates and their ensuing periods and phase shifts; (b) the energy required for equatorial disturbances; (c) the effect of large-scale waves their energy; (d) the change in the growth rate in accordance with the development of the disturbances. 3. Numerical experiments of stratospheric disturbances. An attempt will be made to simulate the occurrence of the warming at 50-100 mb in the 30N-50S. The sensitivity of the cross-equatorial wave flux to the zonal wave number assignment will be investigated.

SUPPORTED BY U.S. Natl. Science Foundation

#### 8.0100, PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY THEIR INTENSITY

T.F. FUJITA, Univ. of Chicago, School of Earth and Atmospheric Sciences, Chicago, Illinois 60637

Abstract: The research paper provides a proposed characterization of tornadoes by their area and intensity. A test characterization of tornadoes in 1950-69 was accomplished. 893 U.S.A. tornadoes in 1965. The intensity and individual area of U.S.A. tornadoes is very similar except for large and intense ones. It was found that the F-scale variation along the path of tornadoes showed an intensity oscillation. Characterization of hurricane intensity by their average typhoons are more intense than the average typhoons.

Pub. Feb. 71: 53p., NTIS No. COM-71-00021: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0101, PROBABILISTIC MODELING OF ENVIRONMENTAL LOADS

Y.K. WEN, Univ. of Illinois, School of Civil Engineering, Urbana, Illinois 61801

This project deals with probabilistic modeling of extreme environmental loads caused by hurricanes and earthquakes. The physical mechanisms of these phenomena which cause these loads are studied, the formulation and the occurrence of these loads are modeled by random processes. The results are in a form suitable for practical applications.

SUPPORTED BY University of Illinois

#### 8.0102, PROBABILISTIC ANALYSIS OF PLASTIC STRUCTURES

T.L. PAEZ, Purdue University, School of Mechanical Engineering, West Lafayette, Indiana 47907

large loads occur, the behavior of most structures is non-linear and often results in plastic deformations. Because excessive deformations could cause a structure to fail, it is important to study the structural response beyond the linearly elastic range by applying probabilistic methods in the solution of structural engineering problems. A method is presented for computing the first-passage probabilities for linear and nonlinear structures. In addition, the probability distributions of accumulated plastic deformation and permanent set in elasto-plastic structures are found. Several numerical examples are also given.

Pub. Aug. 73: 81p., NTIS No. PB-223 328/6: PC \$3.75 MF \$1.45.

SUPPORTED BY U.S. Natl. Science Foundation

### 8.0103, BEACH CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE

C.J. SONU, Louisiana State Univ. Systems, Coastal Studies Institute, Baton Rouge, Louisiana 70803

Abstract: Drastic erosion and swift recovery were the major characteristics of beach changes associated with Hurricane Camille at Fort Walton, Florida. Storm waves caused general erosion of the beach surface, and a scarp about 1 meter deep was produced about 40 meters behind the shoreline. After the hurricane, humps of sand in a train with regular spacing along the shore emerged in the surf zone bed. These were formed by longshore currents, which probably acted on large quantities of sand brought into the surf zone bed as a result of the preceding subaerial erosion. The humps subsequently moved shoreward and eventually climbed on the beach; a substantial part of the exposed beach volume was thus restored about a week after the hurricane.

Pub. Feb. 70: 19p., NTIS AD-709 428: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Navy

### 8.0104, MICROWAVE METEOROLOGY

J.L. KING, U.S. Natl. Aero. & Space Adm., Goddard Space Flight Center, Greenbelt, Maryland 20770 (7470460)

The objective is to develop the microwave radiometer technology for global surveillance of storms from orbit to determine precipitation rate profiles, liquid water content, cloud height, and cloud structure. Passive microwave instrumentation for orbital application will be developed which provide measurements of surface and atmospheric parameters for meteorological requirements. Identification, location, rainfall intensity, wind velocity and storm-systems-dynamics information outside the continental United States and especially over the oceans is only minimally available, if at all. Storm surveillance from space can provide these data for most remote and ocean regions. Storm tracking will be of great benefit in: (1) tropical storm characterization for hurricane warning and storm modification and (2) improved maritime meteorology and ship routing to avoid storms. Microwave frequencies (1.0 cm to 10 cm) are most widely used for meteorological probes. They interact strongly with precipitation while undergoing relatively slight attenuation by the gaseous and charged components. Visible and infrared sensors were the first used for earth observation. (Text Abridged)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

### 8.0105, EXTENDING THE COMPUTERIZED

Abstract: The objective of the research was to develop methods for improved prediction of the movement of tropical cyclones in the 3-7 day time scale; the improved system was to be based on the existing TYPHOON and/or TYPHOON 72 automated programs for producing predictions out to 3 days. The work was divided into 3 tasks: A survey of the 2 existing prediction models and the updating and extending of the analog historical file used by these programs in producing their predictions; to determine the value of large-scale patterns in the prediction of typhoon formation and in subsequent tract prediction; to refine the typhoon analog predictive techniques.

Pub. Sep. 73: 105p., NTIS No. AD-770 207/9: PC \$4.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 8.0106, BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO

M.G. JOHNSON, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Rockville, Maryland 20852

Abstract: Direct and indirect benefits which may be derived from marine environmental prediction are examined in both quantitative and qualitative terms for the eastern Gulf of Mexico area. Conclusions drawn include the following: Of the primary environmental factors affecting the dimensions and types of benefits being derived from marine resources, five appear particularly relevant to commercial fishing and deep-water recreation in the eastern Gulf: Sea state; Air circulation; Temperature; Precipitation patterns; and Special conditions of tropical storms, fog, etc. Sea state is the most significant factor for marine users, followed by wind information. The cost benefits of such predictions are given.

Pub. 1972: 16p., NTIS No. COM-72-11356: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 8.0107, HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY)

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Rockville, Maryland 20852

Abstract: Project STORMFURY is a collaborative effort to control hurricanes. The approach to be used in the field experiments involves seeding the clouds surrounding the eye of a mature hurricane with silver iodide crystals to release the latent heat of fusion. Approximately 200 canisters of pyrotechnic generators are released at an altitude of about 33,000 feet on a line extending radially outward from the storm center and are distributed over 20 miles. Each generator produces 190 grams of silver iodide. Eligible areas for experimentation which have been authorized by the President's Science Advisor and the Department of State, are the Gulf of Mexico, the Caribbean Sea, and the southwestern North Atlantic region. A tropical cyclone is considered eligible for seeding only if the probability is 10 percent or less that the hurricane center will come within 50 miles of a populated area during the ensuing 18 hours. There is no evidence at this time that any adverse effects have occurred or may be expected to occur as a result of these experiments. There is only a remote possibility that seeding will cause a hurricane to intensify or alter its direction of movement. There is the possibility that under certain circumstances the storm surge will increase even though the maximum winds decrease. The

8.0108,

Pub. Jul. 71: 20p., NTIS No. PB-201 257-F: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 8.0108, VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF THE GOES SATELLITE

A.F. FLANDERS, U.S. Dept. of Commerce, Off. of Hydrology, Silver Spring, Maryland 20910

**Abstract:** The paper concerns a new satellite designated GOES (Geostationary Operational Environmental Satellite) which is scheduled to be launched in 1974 by NASA (National Aeronautics and Space Administration) for NOAA. In synchronous orbit 22,000 miles above the equator, GOES will view the United States from the same point continuously and provide a real time data collection system of particular application to hydrology and the water resources community in general. The two GOES satellite system by virtue of its geosynchronous position possesses (1) a continuous viewing capability of the same area of the earth and (2) a real-time data collection and relay service. This near continuous day and night viewing will provide for the detection and tracking of hurricanes, major storm systems, and severe local storms. The data collection system will make it possible for those in the environmental monitoring and prediction field to obtain much needed observations from remote areas essentially upon demand to better warn of and forecast storm events.

Pub. 1974: 23p., NTIS No. COM-74-10524/8: Reprint.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 8.0109, TROPICAL STORM SURGE FORECASTING

C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910 (R1610100)

**Technical objective:** Accelerate modification of the numerical hurricane storm surge forecasting model (SPLASH) to make it suitable for real-time operational use. Determine convenient forms of hurricane input information, as well as easy-to-interpret forms of storm surge forecast output. A feasibility study for real-time storm surge calculations will be made for the U. S. coast of the Gulf of Mexico.

**Approach:** Work will emphasize the Gulf Coast where land-falling storms generate enormous surges such as observed with Hurricane Camille. A sophisticated computer program will be prepared of such generality that input data of ordinary meteorological parameters will output a storm surge forecast for particular locales. The output will be displayed in convenient form for forecast or planning purposes.

**Progress:** The hurricane storm surge forecasting program (called SPLASH) in use at NHC was improved with the addition of astronomical tide forecasts and an areal extension to cover any landfalling tropical storms along the coast between Brownsville, Texas and Shinnecock, N.Y. Work then began on modifying the SPLASH program to also cover alongshore-moving tropical storms.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 8.0110, SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS

C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

coastline. Computations are done by an electronic computer. Surface meteorological parameters are used in an operational program. Qualitative explanations of storm surge phenomena are interspersed throughout the report. The importance of various meteorological parameters such as shelf topography, and coastal geography are discussed.

Pub. Apr. 72: 58p., NTIS No. COM-72-10874: PC \$0.95.

SUPPORTED BY U.S. Dept. of Commerce

# 8.0111, SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART II. TRACK AND VARIANT STORM CONDITIONS

C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

**Abstract:** An operational computer program has been developed to accommodate storms with generalized motions of great complexity. Examples are storms that recurve, remain stationary, accelerate, and decelerate. Also, storm strength and size are allowed to vary in a continuous monotonic manner with time. Such storms and these generalized storms are complicated in motion and they can occur on an extensive coastal area (hundreds of miles). Five track positions (spaced at 6-hour intervals along the storm path) and simple meteorological parameters are used as meteorological input for the program. Detailed phenomena such as explosive deepening, rapid changes in storm track, and sudden changes in storm strength are not considered. In a qualitative manner, several strange dynamic phenomena are illustrated. The storms with generalized motions are illustrated with special examples are computed by the program and interpreted for forecasting.

Pub. Mar. 74: 62p., NTIS No. COM-74-10924: PC \$1.45.

SUPPORTED BY U.S. Dept. of Commerce

# 8.0112, JOINT PROBABILITY METHOD FOR ANALYSIS OF FREQUENCY ANALYSIS APPLIED TO SURGES FROM HURRICANES AND LONG BEACH ISLAND, NEW JERSEY

V.A. MYERS, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

**Abstract:** The paper describes the frequency analysis of combined storm surges and periodic tides prepared as part of the Long Beach Island study. These studies are applied to the ocean beach. Studies of wave action and variations in water levels inshore from the beach. The Long Beach Island are not covered here, nor are other studies such as mapping of the community and structures. The Long Beach Island pilot study in a new area. It is intended to be used in other studies of other coastal communities and to provide needed criteria at this one location.

Pub. Apr. 70: 116p., NTIS No. PB-192 74: PC \$0.65.

SUPPORTED BY U.S. Dept. of Commerce

# 8.0113, MARINE ENVIRONMENTAL PROTECTION - I. LANDFALL STORMS

N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

**Progress:** The operational ocean wave forecast program has been modified to generate a teletypewriter bulletin for WSFO San Francisco containing 12-and 36-hour forecasts of swell height, swell period, swell direction, and wind wave height for the North Pacific. The East Coast extratropical storm surge forecast program was extended from 36 up to 48 hours and forecasts were added for Willets Point, N.Y. The operational SPLASH program for forecasting hurricane storm surge has been improved through the incorporation of revised shoaling factors. SPLASH has also been modified to cover alongshore-moving tropical storms. Computerized surface wind forecasts were derived and implemented for Lakes Huron, Michigan, and Superior. Thus, automated wind forecasts are now provided twice daily over teletypewriter for all five of the Great Lakes. The operational Lake Erie storm surge program has been modified to increase its accuracy and extend the forecast period out to 48 hours. Development of wave forecasts for the Great Lakes has been initiated.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

**8.0114, SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS**

*N.A. PORE*, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

**Abstract:** Contents: Astronomical tide; Extratropical storm surge; Hurricane storm surge; Ocean surface waves; Breakers.

**Pub.** May 70: 110p., NTIS PB-193-449: HC \$3.00 MF \$0.65.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

**8.0115, MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972**

*N.A. PORE*, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

**Abstract:** The storm surge and ocean waves associated with the Atlantic coastal storm of Feb. 18-20, 1972, caused extensive damage along beaches of Long Island and New England. Meteorological conditions of the storm, along with resulting tides, surges, and waves, are described. Comparison is made with forecasts of the storms produced by the primitive-equation model of the National Meteorological Center, as well as with automated forecasts of storm surge and wave height. It is concluded that the meteorological forecasts and the resulting storm surge and wave forecasts were quite good.

**Pub.** Feb 73: 9p., NTIS COM-73-50496-04-08.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

**8.0116, FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES**

*N.A. PORE*, U.S. Dept. of Commerce, Techniques Development Lab., Silver Spring, Maryland 20910

**Abstract:** The National Weather Service (NWS) has developed a technique for forecasting extratropical storm surges along the northeast coast of the United States. The storm surge is caused mainly by the strong winds associated with extratropical storms over nearshore areas. Empirical forecast equations have been derived for 10 locations from Portland, Maine to Norfolk, Va. with data from 68 storms that occurred from 1956 through 1969. Input data to the technique are sea-level pressure values as forecast by the Primitive Equation (PE)

forecasts from any source. Experience has emphasized the importance of accurate input sea-level pressure forecasts. Conclusions are that the system is useful. Plans are to include other locations.

**Pub.** 1974: 74p., NTIS No. COM-74-10719/4: PC \$1.45.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

**8.0117, NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH**

*G.F. CARRIER*, Harvard University, School of Arts and Sciences, Cambridge, Massachusetts 02138 (N00014-67-A-0298-0033)

The Navy has broad programs of research both as to the nature of turbulent flow phenomena and as to severe storms and their prediction and control. This research should lead to improved understanding: (1) of the initiation, intensification and maintenance of hurricanes thus leading to improved means of influence and control; and (2) of turbulent flow phenomena and the role of polymer additives thus leading to means for optimizing vehicle drag reduction.

The problem of the initiation, intensification and maintenance of hurricanes will be investigated theoretically. An attempt will be made to describe this complex phenomenon in terms of tractable mathematical equations which, although simplified, still retain the essential features of the dynamics. In this manner useful engineering results will be obtained which not only contribute to the understanding of hurricane mechanics but also provide a basis for the development of more complex mathematical models. Experiments of grid turbulence in flowing methanol and studies of shear rate on the viscosity of dilute solutions of polymer additives will be carried out.

**Supporting agency address information:** Office of Naval Research 438, Arlington, Va. 22217

**SUPPORTED BY** U.S. Dept. of Defense - Navy

**8.0118, PROFILE OF A STORM - WIND, WAVE, AND BEACH EROSION ON THE SOUTHEASTERN SHORE OF MICHIGAN**

*B.T. FOX*, Williams College, Graduate School, Williamstown, Massachusetts 01267

**Abstract:** A large low pressure system that passed the southeastern shore of Michigan during late July 1969, provided opportunity for a detailed analysis of storm effects on beach and coastal processes. During the passage of this storm, observations of 17 environmental parameters were being recorded at 17 intervals. These data were subjected to Fourier analysis and plotted in a time series by computer. Such analysis has shown that there is a definite relationship between barometric pressure, breaker height, breaker angle and longshore current velocity. These are among the significant factors in beach erosion. As the storm passed, the beach and dune area underwent extensive erosion. The post-storm profile of a nearshore sand bar which was derived from the data during the storm. During succeeding days, this bar migrated shoreward and was eventually incorporated into the beach.

**Pub.** 1970: 9p., NTIS No. AD-723 932: Reprint.

**SUPPORTED BY** U.S. Dept. of Defense - Navy

**Purpose of study/investigation:** To determine the effects of a hurricane protection structure with all tidal passages open on tidal heights, current velocities, salinities, temperatures, and dye dispersion within Jamaica Bay for normal tides. Plans which had no adverse effects on the above phenomena and which did not create maximum velocities hazardous to navigation were subjected to hurricane surges to determine the amount of suppression obtained throughout Jamaica Bay. An additional objective of the investigation to improve the quality of water in the Bay has been added by the New York District. This modification may involve barrier gate operation and/or structural changes in the Bay.

**Approach or plan:** The Jamaica Bay segment of the existing New York Harbor Model was updated to topographic conditions of 1967. The existing New York Harbor model linear scale ratios are 1:100 vertically and 1:1000 horizontally. A hurricane surge generator was added to the model to conduct the surge test. A series of tests was conducted for existing conditions and then duplicated for plan conditions: comparison of test results allows the effects of the plans to be evaluated.

**Progress to date:** New York District personnel recommended a barrier plan consisting of a 300-ft-wide ungated navigation opening to natural bottom depths (approximately -32 ft msl) plus six 75-ft-wide gated tidal passages with bottom sills to an elevation of -26 ft msl on each side of the navigation opening. Model tests indicated no adverse effects on tidal heights, current velocities, salinities, and dye dispersion within Jamaica Bay; however, the plan would not provide adequate suppression of the hurricane surge elevations within the Bay. Plan 6 included a 110-ft wide ungated navigation opening to natural bottom conditions plus eight 75-ft-wide gated tidal passages with bottom sills to elevations of -26 ft msl on each side of the navigation opening. This plan had no adverse effects on the related phenomena and provided the required suppression of hurricane surges within the Bay; however, the 110-ft-wide navigation opening did not meet the present navigation needs which require a minimum opening of 150 ft. A series of hurricane surge tests was conducted utilizing widths of navigation openings varying from 150 to 200 ft. These openings provided bottom sill elevations varying from -23 ft msl to -26 ft msl.

**SUPPORTED BY** U.S. Dept. of Defense - Army

#### 8.0120, MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS

Y. KURIHARA, Princeton University, Graduate School, Princeton, New Jersey 08540

The objectives of this research involve study of four geophysical phenomena of relatively small scale using numerical modelling techniques. The investigations include: construction of a three-dimensional model to study the asymmetric structure of hurricanes as it affects genesis and movement of the system; the use of a three-dimensional model of convective motions to study the effect of vertical wind shear of cloud band orientation; the application of ocean circulation models to motions in a lake; and modelling the effects of confined heating on the atmospheric boundary layer and the free atmosphere through the agency of internal gravity waves.

**SUPPORTED BY** U.S. Natl. Science Foundation

#### 8.0121, CASE STUDIES OF COASTAL CONVECTIVE

**Abstract:** The life cycles of coastal convective storms studied utilizing a Doppler weather radar. The storms involve storms triggered by the sea breeze, and vertical scanning as well as fixed vertical scanning utilized to observe the storms. Analyses of the storms suggest that convective storms move with the wind updraft rather than the environmental wind. The interaction between the vertically moving air and the environmental flow determines the time history of the storm.

Pub. Apr. 74: 75p., NTIS No. AD-778 361 \$1.45.

**SUPPORTED BY** U.S. Dept. of Defense -

#### 8.0122, ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS FOR THE MONTH OF SEPTEMBER)

H.L. CRUTCHER, U.S. Dept. of Commerce, Center, Asheville, North Carolina 28801

Tropical cyclone strike probabilities for selected stations for the several specified seasons and time intervals. The selected stations are Cape Kennedy, Vero Beach, Test Facility, Bay St. Louis, Mississippi, Virginia Beach, and Houston, Texas. The seasons are August, September, October, and November. The time intervals are 12-, 24-, 36-, 48-, 72- and 96-hour intervals. September strike probabilities are shown for the time periods for the five-degree latitude-longitude squares in the North Atlantic, Caribbean and Gulf of Mexico. The strike probabilities are given for circles having two and three degrees of latitudes and centers at the selected station or the centers of the five-degree squares. These probabilities are compared with the statistical climatologies of tropical cyclone strikes presented by Crutcher (1971). The model assumes a bivariate normal distribution.

Pub. Aug. 71: 104p., NTIS No. N71-35765:

**SUPPORTED BY** U.S. Natl. Aero. & Space Admin.

#### 8.0123, PRELIMINARY CLIMATIC DATA FOR HURRICANE AGNES JUNE 14-23, 1972

R.M. DEANGELIS, U.S. Dept. of Commerce, Center, Asheville, North Carolina 28801

**Abstract:** The report gives a preliminary climatic data for Hurricane Agnes June 14-23, 1972, and its sequences. Hurricane Agnes caused one of the most disastrous in United States history. Recent years have caused floods from North Carolina to New York. Pennsylvania, New York, Virginia, and Florida was beset with storm tides and tornados. Given concerning the storm history, the climatic data records from ship land and aircraft records and from remotely sensed observations (satellite). Data are given on extremes of pressure, wind speed, and rainfall. New records were established. Appended are the chronology of the hurricane, maps of the storm, weather maps, and preliminary flood stage maps.

Pub. Aug. 72: 67p., NTIS No. COM-72-111 \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce -

#### 8.0124, ALTERNATIVE ADJUSTMENT

Federal flood control policy which is leading to changes in Federal policy. Response to the drought of the mid-1960's in Massachusetts is analyzed. Arguments are presented against single solutions, and emphasis is placed on the need for research on alternatives.

Pub. Dec. 71: 127p., NTIS No. PB-211 922; PC \$5.45 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0125, NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES

R.A. ANTHES, Penn. State University, School of Earth Sciences, University Park, Pennsylvania 16802

The general objective of this research is to model numerically the rainband circulation of tropical cyclones. The specific areas to be investigated are as follows: (1) the generation mechanisms - a study of what physical processes in the model are necessary and sufficient for the rainband scale instability. Linear techniques will be used as well as integration as an initial value problem of the time-dependent, linearized equation. (2) The possibility of a CISK-type process operating on the scale of the bands - careful study of the low-level vorticity and divergence patterns should help to ascertain the importance of the parameterized convective heating on the maintenance of the rainbands. (3) The contribution of the bands to the energy and angular momentum budgets of the tropical cyclone - budget calculations should determine the relative importance of these processes. (4) The possible effects on storm dynamics of enhancement or suppression of the bands - once an understanding of the interactions between the rainbands and the tropical cyclone circulation are understood, it may be possible to simulate numerically modification of the rainbands.

SUPPORTED BY U.S. Natl. Science Foundation

#### 8.0126, ANALYTICAL PHYSICAL MODEL

F.M. WHITE, Univ. of Rhode Island, School of Engineering, Kingston, Rhode Island 02881

Objectives: The objective of this project is to develop and verify a mathematical computer model which has the capability of predicting the spatial and temporal variations of the physical characteristics of Narragansett Bay. When completed, this model should be able to compute, at any time in the past or future and at any point in the Bay, the tidal heights, current salinity, temperature, and certain chemical species concentrations, notably dissolved oxygen. The model will also be able to take account of proposed changes in the dynamics of the Bay, such as hurricane barriers, thermal discharges, sewage outfalls, and channel dredging, with a view toward its use in decision-making and management of Narragansett Bay. The experimental verification of the model is being provided by the Bay Watch program.

How information will be applied: the information derived from this model has three primary uses: 1) to aid in Bay management by providing design studies of proposed physical changes; 2) to provide detailed predictions of the physical state of the Bay, in the past or in the future, for use in coordinating experimentation in the Bay; and 3) to provide physical parameters for use with the associated biological and socio-economic models being prepared under other projects associated with the Systems Model Studies.

flow rates at various key points in the Bay. 2. The depth-averaged salinity model is now being applied to dye study problems. 3. The temperature model is now being applied to the proposed Rome Point power plant. 4. The laterally-averaged, water-quality model has been completed and successfully compared to dissolved oxygen and biochemical oxygen demand data from the Bay. 5. A finite-element model for rapid calculations of physical and biological parameters in the Bay is now being developed, in cooperation with the Systems Ecology Project.

For additional information pertaining to this project contact Dr. Niels Rorholm, Coordinator, Sea Grant Programs, University of Rhode Island, Kingston, Rhode Island 02881.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0127, SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE LISTING OF TROPICAL CYCLONES THAT HAVE AFFECTED SOUTH CAROLINA

J.C. PURVIS, U.S. Dept. of Commerce, Natl. Weather Service, Columbia, South Carolina

Abstract: The publication contains a descriptive listing of tropical cyclones that have affected South Carolina and for which records are available. The record begins with two storms in the 17th century and continues to date. Introductory notes on hurricane phenomena and September gales are followed by a statement on modern tracking and warning. Finally there is a chart showing the number of tropical cyclones by month, percent of seasonal total and the number of cyclones per year, for various time periods.

Pub. 1973: 56p., NTIS No. COM-73-11533/9; PC \$5.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0128, INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS

B.N. SEELIG, Texas A & M University System, Graduate School, College Station, Texas 77843

Abstract: An environmental study was conducted at Sargent Beach, Texas, an erosive beach bordering the Gulf of Mexico. The objectives of this study were to determine the characteristics of the beach, the magnitudes of changes which have occurred at Sargent Beach, and to analyze possible factors which may be controlling the observed beach changes. Results show the beach has eroded at an increasing rate since at least 1930 with recent shoreline retreat rates averaging 30 feet per year. Storms are the primary agents that remove material from the beach, while lost sediments are not replaced because Brazos River sands normally expected to move alongshore are trapped in the Brazos delta. Hurricanes may free stored deltaic sands carrying major quantities offshore from beach areas. Beach erosion is further aggravated by decreased sand input to the coast from the Brazos River due to alterations to the river and its drainage basin in the 1940's.

Pub. Sep. 73: 162p., NTIS No. COM-74-10157/1; PC \$4.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0129, OBJECTIVE ANALYSIS OF THE SEA SURFACE TEMPERATURE

B.R. JARVINEN, U.S. Dept. of Commerce, Natl. Weather Service, Fort Worth, Texas 76102

**Abstract:** A program has been developed which analyzes sea surface temperatures on an operational and research basis. Data were composited for five-day periods from the thirteenth to the seventeenth for the months of June, August, September, and October, during the 1972 hurricane season. Sea surface temperature and anomaly charts were computed. These charts are discussed in relation to tropical cyclone activity. A relationship exists between tropical cyclone activity and sea surface temperature. The real-time, objective analysis of sea surface temperature and computation of anomalies identify those areas of warm SST which can serve as ready sources of energy for development or intensification of tropical cyclones.

Pub. Aug. 73: 21p., NTIS No. COM-73-11643/b. PC \$2.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0130, A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service, Fort Worth, Texas 76102

**Abstract:** A Bayesian analysis, in real time, is made on the performance of competing numerical and statistical models in predicting the point at which a hurricane will make its landfall on a virtual coastline, 18 and 30 hours following the observations upon which the forecast is based. The results indicate to the hurricane forecaster how each model has performed and will identify the model whose next prediction will have the most dependable basis for a warning decision. This example of a machine program to process and organize information on the performance of competing hurricane prediction methods illustrates how Bayesian analyses may be combined with other statistical parameters to supply a basis for sound decisions on critical forecast problems. It is expected that this initial effort will open up many new avenues for applying decision and information analyses to the more formidable and intractable weather prediction problems, especially those of the tropics.

Pub. Aug. 73: 16p., NTIS No. COM-73-11663/4. PC \$2.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0131, THE DECISION PROCESS IN HURRICANE FORECASTING

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service, Fort Worth, Texas 76102

**Abstract:** The main thrust of development programs at the National Hurricane Center is to provide objective diagnostic methods for evaluating the numerical prediction results by analyzing the dynamical character and tendencies of the vortex environment and of the vortex itself. The procedures and decision ladders for each phase of the forecast are described, including the positioning of the center, the development of a disturbance, growth of a vortex, and movement of the center.

Pub. Jun. 71: 39p., NTIS No. COM-71-00336. PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 8.0132, ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service, Fort Worth, Texas 76102

**Abstract:** From a recently completed climatology of hurricanes at the National Hurricane Center covering a period of 85 years of record, the total number of incidents and the

Pub. Jun. 71: 19p., NTIS No. COM-71-00750.95.

SUPPORTED BY U.S. Dept. of Commerce

#### 8.0133, SEDIMENT MOVEMENT AND MORPHOLOGY IN THE CENTRAL APPALACHIAN - VIRGINIA

UNKNOWN, U.S. Dept. of the Interior, Arlington, Virginia 22209

Sediment, particularly in connection with major floods, causes many deaths and millions of dollars of damage annually. The destruction results from its deposition, its movement down hillsides and along its deposition. The prediction of impeding events and the prevention or reduction of damage will not be possible until systematic, planned geomorphic studies are made.

To derive a basis for predicting the occurrence of major sediment movements on hillslopes in the Central Appalachians and nearby areas, to prevent or reduce the customary widespread damage to man and his property from such movements.

Document and examine the geomorphic features of catastrophic sediment movements which resulted in central Virginia from the Camille in 1969. Measure and evaluate the rate of erosion, the amount and location of sediment particles involved, geomorphic features of affected and unaffected hillslopes and valleys, and features which may aid in attaining the results.

Obtained further field data on channel profile and material samples. Continued analyzing channel geometry. Wrote further portions of first report on same. Results to date show some promising relationship between flow characteristics and certain measurable features of the channel cross-section and sizes of bed material.

Complete the analysis of the data on hand; draw data as the need arises; draw conclusions; draft of manuscript.

SUPPORTED BY U.S. Dept. of Interior -

#### 8.0134, FORECASTING STORM-INDUCED CHANGES ALONG VIRGINIA'S COAST

W. HARRISON, Virginia Inst. of Marine Sciences, Virginia 23062

**Abstract:** The purpose of this study was to develop a method for operational prediction of storm-induced changes. The thought was to use wind and wave data that are predicted on a routine basis by the National Weather Service, NOAA, and it was felt that if a method could be developed, it would be possible to predict beach erosion or deposition as part of the forecasts whenever storms threatened. It might be possible to make estimates of beach changes during previous years by using historical data in the prediction scheme.

Pub. Dec. 71: 117p., NTIS No. AD-75250.95.

SUPPORTED BY U.S. Dept. of Defense

#### 8.0135, OPERATION AGNES

A. KUO, Virginia Inst. of Marine Sci., Gloucester Point, Virginia 23062

System and on the transport of material substances including nutrients, suspended sediments, pesticides and metals. Other phases of the study are focusing on the impact of biologic components. Our emphasis is on the path of Susquehanna River water as it passes down the Bay, out of the mouth and onto the shelf. This phase of the work interfaces within the total program with the ongoing monitoring programs in the James, York and Rappahannock Rivers.

SUPPORTED BY U.S. Natl. Science Foundation

#### 8.0136, STORM-SURGE FORECASTING

J.W. NICKERSON, U.S. Navy, Weather Research Facility, Norfolk, Virginia 23511

**Abstract:** The report contains an adaptation of a unique storm-surge forecasting technique developed by Dr. C. P. Jelesnianski. This technique results in a computed storm surge profile at the inner boundary of an artificial standard basin seaward of the coast. The profile is derived from nomograms based upon a standard storm passing over a standard basin. Thumb rules and guidelines are presented in the publication for subjectively modifying the computer storm surge height as it moves shoreward of the artificial basin boundary, to fit the natural conditions of a particular coastline. Major advantages of this system are its applicability to almost any locale, its adaptability to data normally available to the field forecaster and the speed with which the forecast may be modified to remain current with natural fluctuations of the storm.

Pub. Apr. 71: 100p., NTIS No. AD-751 578; PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 8.0137, ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS OF EXTRATROPICAL CYCLONES

D.R. JOHNSON, Univ. of Wisconsin, Graduate School, Madison, Wisconsin

The objective of this research is to study the energy, mass, and angular momentum budgets of the extratropical cyclone. Particular emphasis will be placed on the roles of the polar jet stream and diabatic processes during the life of cyclones. Several case studies of developing and dissipating stages are proposed to compare the relative importance of angular momentum and energy fluxes across the lateral boundary of the storm volume with the vertical redistribution and sources and sinks within the volume. Through these comparisons the interaction of the extratropical cyclone with its environment will be examined. In support of the examination efforts will also be made to develop objective analysis techniques which can be applied to studies of the extratropical cyclone and jet stream.

SUPPORTED BY U.S. Natl. Science Foundation

#### 8.0138, NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO

D.B. RAO, Univ. of Wisconsin, School of Letters, Milwaukee, Wisconsin 53201

This study will carry out integrations on a sequence of numerical models to determine (1) the three-dimensional circulation patterns induced by seasonal winds, (2) the changes in the mean circulation patterns in response to changes in seasonal winds, and (3) the lake level response induced by severe atmospheric disturbances. The shape of the coastal boundary and bottom topography will be taken into account in the nu-

## 9. LAND SLIDES

### DISASTER MITIGATION

#### 9.0001, REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA

T.W. DIBBLEE, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The objective of this project is to produce a geologic map of a belt some 80 km wide along a 500-km-long segment of the San Andreas fault zone from Hollister to Desert Hot Springs. The geology is being plotted on available 15' 1:62,500-scale and 7 1/2' 1:24,000-scale topographic quadrangles base maps from field work and from adequate published and available unpublished geologic mapping. All these data are being compiled onto four specially prepared 1:125,000-scale topographic base maps, each covering a 125-km long segment of the San Andreas fault. Each of these geologic maps will be accompanied by several cross sections and descriptions of the rock units. Also planned for publication are several 1:62,500-scale quadrangle transects astride certain critical parts of the fault.

The basic geology mapped throughout this area will serve many purposes, such as location of materials suitable for construction of highways, canals, and dams; location of geologic hazards such as faults, landslides, and unstable rock units; and classification of land and exploration for water, petroleum or gas and mineral deposits.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 9.0002, REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA

D.H. RADBRUCHHALL, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

Topical study to determine regional geologic factors that contribute to land-sliding in selected areas of the United States. Areas are being studied in Northern Coast Ranges and the Transverse Ranges of California, and in the vicinity of Pittsburgh, Pennsylvania. Principal objectives are to determine which regional geologic factors (as opposed to local factors triggering individual slides) or combination of factors are critical in determining regional slope stability, so that these factors can be taken into account in planning and construction, particularly of large projects. The work will consist of literature search covering all pertinent data on such factors as climate, slope, tectonic and geologic history, and erosion rates; aerial photograph studies to map distribution of landslides in study areas; examination of selected landslides on the ground to determine their characteristics; and field examination of geologic units in study areas to determine their pertinent physical properties, including composition, weathering, permeability, and state of fracturing. The study may involve measurements of state of stress in the earth's crust and its relationship to regional landslide patterns.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 9.0003, MOBILIZATION OF DEBRIS FLOWS 9973-EN

A.M. JOHNSON, Stanford University, School of Earth Sciences, Palo Alto, California 94305 (DA-ARO(D)-31-124-71-G158)

To study debris-flow, a form of rock waste transport. This work is concerned with the fundamentals involved in the cause and effect of debris flow, such as landslides. Such phenomena



Field investigations, laboratory experiments and theoretical studies of this selected type of landslide will be studied.

Supporting agency address information: OCRD Research Office  
Durham, Durham, N.C. 27706

SUPPORTED BY U.S. Dept. of Defense - Army

#### 9.0004, GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS

*J.B. SEED*, Calif. Inst. of Technology, Graduate School,  
Pasadena, California 91109

Abstract: The report summarizes the findings of the Natural Hazards Review Panel whose mission it was to investigate the nature and magnitude of the threats posed to Naval bases by earthquakes and earthquake-related natural hazards including tsunamis, seiches (and the accompanying flooding), landslides, mudflows and soil foundation failures which may result from earthquakes. In addition to citing specific problems for Naval bases in the San Francisco, San Diego and the Manila areas, the introduction to this report recommends conducting a rapid visual survey initially to pinpoint the nature of various danger areas. It then recommends the follow-on procedure leading to various strategic and engineering decisions which will provide the required degree of protection to insure Fleet Operational Readiness and to provide cost effectiveness in protecting the Navy against serious earthquake damage.

Pub. Jan. 74: 45p., NTIS No. AD-778 005/9: PC \$3.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 9.0005, EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA

*R.A. FORSYTH*, State Div. of Highways, Sacramento, California 95814

A 'reinforced earth' test installation will be constructed as part of a landslide correction project on Rte 39 near Los Angeles for the purposes of evaluation of construction cost and behavior. The test embankment will be instrumented with strain gages, slope indicators, soil pressure cells and extensometers. Resulting data will be utilized to evaluate current 'reinforced earth' design procedures and theories.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 9.0006, SUBAUDIBLE ROCK NOISE (SARN) AS A MEASURE OF SLOPE STABILITY, CALIFORNIA

*R. MEARNES*, State Div. of Highways, Sacramento, California 95814

Abstract: A technique for using subaudible rock noise (SARN) to measure slope stability has been developed by the California Division of Highways. The technique and the equipment used are described and instructions for their application are presented. Several case histories are described to illustrate some of the types of problems to which SARN monitoring can be applied. The Division is planning to perform SARN monitoring as a routine method for stability evaluation and is assembling the necessary equipment.

Pub. Aug. 73: 62p., NTIS No. PB-227 965/1: PC \$3.75 MF \$1.45.

SUPPORTED BY California State Government - Sacramento

#### 9.0007, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR

Abstract: This report recommends loss-reducing measures for 10 geologic problems which collectively estimated \$55 billion loss in California's urban areas up to 2000. The problems are earthquakes, mineral resources to urbanization, land subsidence, erosion activity, expansive soils, fault displacement, tsunami hazards, and subsidence. The report describes the nature, distribution, and frequency of each problem, as well as costs and effective reduction measures, and agencies responsible for their solution.

Pub. Jun. 73: 111p., NTIS No. PB-222 145.

SUPPORTED BY U.S. Dept. of Housing and Urban Development

#### 9.0008, RIPRAP SLOPE PROTECTION - DAMS - A REVIEW OF PRACTICES AND PROCEDURES

*F.J. DAVIS*, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

Abstract: Bureau of Reclamation practices for riprap slope protection, investigation, sampling, testing, and field application. Riprap slope protection for earth dams are reviewed. 50 case histories of riprap slope protection are presented. The performance of most upstream slope protection on earth dams has been essentially as anticipated. The cost of providing upstream slope protection, including lifetime maintenance costs, is the primary factor in selecting, designing, and constructing riprap slope protection. Although experience indicates that a riprap blanket larger than 1 cu yd would be required on most earth dam structures to protect slopes against erosion during storms, few rock sources can provide riprap of this size. Hence, a 36-inch blanket of riprap granular material is considered the maximum protection that can be obtained. Specifications should be revised to require a gradation that contains more of the larger size material, placing requirements to obtain a denser riprap, and greater selectivity of quarry material, and to limit the use of quarry blasting techniques. Detailed case histories of riprap sources are included.

Pub. Mar. 73: 28p., NTIS No. PB-219 805/1: PC \$0.95.

SUPPORTED BY U.S. Dept. of Interior

#### 9.0009, LOCATION OF SLOPE FAILURE ZONES

*R.H. MERRILL*, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

The object of this research is to detect failure zones in slope walls before slope sliding occurs. Successful completion of this work will result in a knowledge of the location of failure zones and will give early information from which corrective action can be taken to avoid disastrous slides in slope walls.

The planes will be monitored for microseismic activity. The noises shall be used in an attempt to triangulate the location of the noise. The work will be performed at the Ruth mine, Kennecott Copper Corporation, Alaska.

SUPPORTED BY U.S. Dept. of Interior

#### 9.0010, SHEAR STRENGTH OF FINE GRAINED SOILS - WEST POINT, NEW YORK

*UNKNOWN*, Transportation Res. Board, Washington, D.C.

Performance of a fill foundation at West Point, New York; A method for determining the strength parameters of soils; Characteristics of some clay soils from Wisconsin.

Pub. 1973: 71p., NTIS No. PB-227 031/2: PC \$2.20 MF \$1.45.

SUPPORTED BY Natl Academy of Sciences - Washington

#### 9.0011, ENGINEERING GEOLOGY - ILLINOIS

W.C. SMITH, State Geol. Survey, Urbana, Illinois 61801

Geological conditions and their relationship to engineering problems are being researched. Cooperation is extended to other state departments with special reference to highway construction, dam sites, reservoirs, foundation conditions. Field conferences, examination of borings, and preparation of reports are undertaken for other state departments or at the request of consulting engineers engaged on various projects. Reports issued: 'Geologic Factors in Dam and Reservoir Planning', W.C. Smith, Ill. St. Geo. Surv. Environmental Geol. Note 13, 1966. 'Geology and Engineering Characteristics of Some Surface Materials in McHenry County, Illinois', W.C. Smith, Ill. St. Geo. Surv. Environmental Geol. Note 19, 1968. 'Preliminary Geological Evaluation of Dam and Reservoir Sites in McHenry County, Illinois', W.C. Smith, Ill. St. Geo. Surv. Environmental Geol. Note 25, 33pp, 1969. 'Geologic Investigation of the Site for an Environmental Pollution Study', P.B. Dumontelle, Illinois State Geological Survey Environmental Geology Note 31, 1970. 'Landslides Along the Illinois River Valley South and West of La Salle and Peru, Illinois', P.B. Dumontelle, N.C. Hester, and R.E. Cole, Illinois State Geological Survey Environmental Geology Note 48, 1971.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Illinois State Government - Springfield

#### 9.0012, STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS

G. MESRI, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

This study deals with the creep properties of soil and rock under triaxial conditions. An elaborate constant-load triaxial testing system has been designed and constructed. The creep testing system (CTS) consists of four independent units. The axial loads, axial deformations, cell pressures, and pore pressures are automatically observed and recorded by a digital indicator and teletype. Tests are being performed on soil and soft rock specimens using various load and time histories. Presently available creep equations (stress-strain-time relations) for soil and rock are being analyzed. An attempt is being made to extend our understanding of the physical significance of creep parameters. Also new creep equations are being developed.

SUPPORTED BY University of Illinois

#### 9.0013, WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL.

P.C. CLARK, State Highway Commission, Topeka, Kansas 66612 (2R63226543)

Objectives are to determine the conditions that lead to fill slides on highways and to develop means of preventing or halting such slides. Hydrologic and man-made geologic conditions existing in each fill, under study, are being determined. Vertical drains are being installed in some fills to see if draining of water will help stabilize the fill and halt or prevent fill slides. Water flow measurements are being moni-

Document provided to S.S.I.E. By the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 9.0014, INVESTIGATION OF LANDSLIDES ON HIGHWAYS

J.H. HAVENS, State Div. of Res., Frankfort, Kentucky (2R63201259)

Study is conducted to evaluate and improve current exploration methods and techniques of interpretation of subsurface conditions and available methods for analysis, design and construction whereby embankment failures on highway facilities can be minimized.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

#### 9.0015, LANDSLIDES - KENTUCKY

C.T. GORMAN, State Bur. of Highways, Lexington, Kentucky 40508

Side-hill cut-and-fill sections are typical design features of roadways in much of the mountainous or hilly terrain of Kentucky. Lateral seepage of groundwaters into side-hill fills and attendant damming and increased pore pressures have been suspected as major causes of landslides. Monitoring and surveillance of potential landslides will be conducted for collection of data for use as future design remedies. Study objectives are to 1) determine the causes of side-hill instability, 2) observe long-term movement using slope indicators at selected sites where side-hill failures are in progress, 3) develop an automated direct shear apparatus for measuring peak and residual soil shear strength, 4) develop correlations between laboratory triaxial shear strength and in situ shear strength obtained from Dutch cone penetration tests and vane shear tests, and 5) compare peak, residual, and in-situ strength with calculated shear strength at sites where failures are occurring.

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SUPPORTED BY Kentucky State Government - Frankfort

#### 9.0016, SLOPE STABILITY OF CUTS IN ONTONAGON CLAY

I.A. ALNOURI, State Dept. of Highways, Lansing, Michigan (2R63221066)

The main objectives are (1) Record and analyze existing slides. Determine actual shearing strength of soil and causes of failure. (2) Suggest suitable and economical corrections for existing slides. Recommend preventive measures for potential slide areas. (3) Propose a procedure for slope stability analysis to be used in the future design of cuts in on-tonagon clay.

Document provided to S.S.I.E. By the H.R.I.S.

SUPPORTED BY Michigan State Government - Lansing

#### 9.0017, CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA

P.F. KERR, Columbia University, School of Arts, New York, New York 10027

Abstract: Several landslides with substantial displacements along clay-bearing bedding planes occur in road cuts along the Los Angeles - San Francisco super highway Interstate 5, between Castaic and Gorman. Geometrically such slides occur where the strike of wet clay-bearing strata in road cuts lies parallel to the roadway, and the inclination is toward the roadway at an angle less than the slope of the cut. They also

9.0018,

Pub. Jul 70: 49p., NTIS No. AD-715 920: PC \$3.00 MF \$0.95.  
SUPPORTED BY U.S. Dept. of Defense - Air Force

**9.0018, INVESTIGATION OF RED RIVER VALLEY  
GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND  
PERFORMANCE**

D.K. LEER, State Highway Department, Fargo, North Dakota  
58102

Abstract: The investigation includes a detailed study of the geology, past performance of structures, and soil mechanics. The sites selected for the study of the soils and landslides were instrumented with slope inclinometer to establish shear planes and to evaluate the strength of the soils in the field as compared to laboratory strength analysis. Through this procedure, the residual soil strengths can be used for design purposes and the reactions imposed on structures can be estimated. The investigation indicated that the main factors contributing to the river bank failures are the loads imposed by embankments and by draw-down after periods of flooding. Recommendations for new bridge design are given.

Pub. Sep. 70: 59p., NTIS No. PB-196 133: PC \$3.00 MF \$0.95  
SUPPORTED BY U.S. Dept. of Transportation - Off. Sec.

**9.0019, SLOPE STABILITY OF CERTAIN SELECTED  
COLLUVIAL SOILS**

C.J. HAYES, State Dept. of Highways, Oklahoma City,  
Oklahoma (2R63221056)

The degree of stability of colluvial soils will be rated and classified according to the degree of hazard so that the stability problems, e.g. landslides, can be anticipated. Mapped unstable soils (colluvium) are selected and a moisture sensing apparatus is placed in the soils to monitor the types and amount of flow. Underdrains of various types are placed in the colluvium at selected locations with changes in the flow of moisture to be monitored. Slope stability ratings of certain mapped soils will be made available to design engineers so that unstable slope conditions can be rectified or avoided.

Document provided to S.S.I.E. By the Highway Research Information Service

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**9.0020, FLOW SLIDE CONTROL WITH SLOPE REVET-  
MENTS**

W.L. SCHROEDER, Oregon State University, School of Engineering, Corvallis, Oregon 97331

The proposed research is aimed at developing design criteria for revetment-type protection of loose submerged cohesionless soil slopes. The proposed research program involves scaled laboratory experiments to determine relationships among several variables (liquefaction, densification, pore pressure, etc.) and slopes subjected to vibrational or shock induced loading.

SUPPORTED BY U.S. Natl. Science Foundation

**9.0021, ROCK STRENGTH FROM FAILURE CASES -  
POWERHOUSE SLOPE STABILITY STUDY, FORT PECK  
DAM, MONTANA**

J.V. HAMEL, Hamel Geotechnical Consultants, Rapid City,  
South Dakota 57701

MAIO

Upper Missouri River Valley. The Fort Peck site geology are briefly described. Stable and the powerhouse slope are presented and recommendations are given for further study and action with detailed planning of stabilization.

Pub. May 73: 183p., NTIS No. AD-761 509: PC \$0.95.

SUPPORTED BY U.S. Dept. of Defense

**9.0022, LANDSLIDE STUDIES IN SOUTH DAKOTA  
PORT NO. 1 - LOCATION OF AREAS WITH  
SLIDE POTENTIAL IN THE PIERRE SHALES**

J. SCULLY, State Geol. Survey, Vermillion, S.D.  
57069

Abstract: Areas with a high landslide potential are areas where the shale has a high degree of saturation. Landslides occur in certain geologic members of the Pierre. Several methods for locating areas with high landslide potential. Areas with a high landslide potential and higher seismic velocities and penetration resistance values in areas with a high landslide potential will be lower than the values in stable areas. Results of strength tests run on samples from areas with high slide potential differ from those of samples from stable slopes. The water contents and the degree of saturation are higher and the unconfined compressive strength and modulus of deformation is lower. The results of samples in potential slide areas often have a peak strength occurs at high water contents. Several methods, areas with high landslide potential are avoided, or stabilized during highway construction.

Pub. Dec 70: 84p., NTIS No. PB-201 155: PC \$0.95.

SUPPORTED BY U.S. Dept. of Transportation

**9.0023, A SURVEY OF EARTH SLOPE STABILITY  
REMEDIAL MEASURES IN TEXAS**

T.G. ABRAMS, Univ. of Texas, Ctr. for Earthquake Engineering,  
Austin, Texas 78712

Abstract: The results of a survey undertaken in Texas where there has been a high incidence of failure and to identify some of the factors involved in these slides are presented. In conjunction with a review of present slope design procedures, remedial measures employed by the Texas Highway Department for repair and maintenance of earth slopes are reported. The major slope failures of significance are associated with primarily excavated slopes of fissured clays and clay shales, although some failures of fill slopes constructed of high strength materials also encountered in several areas. A number of remedial measures have been employed for repair and maintenance including regrading, stabilization with lime, concrete, and various forms of restraint or reinforcement. While excessive amounts of ground water are usually present at most sites where slope failures have occurred, drainage of water has not been a remedial or preventive measure.

**D.N. SWANSTON**, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta., Juneau, Alaska 99801

**Abstract:** Studies indicate a combination of total saturation, slopes with gradients above the natural angle of stability (greater than 34 degrees), and loss of the stabilizing effect of anchoring tree roots are the principal causes of debris avalanching on till soils in southeast Alaska.

Pub. Sept. 70: 21p., NTIS No. PB-194 166: MF \$0.65.

**SUPPORTED BY** U.S. Dept. of Agriculture

**9.0025, COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE PROTECTION FOR EARTH EMBANKMENTS**

**J.K. MITCHELL**, Univ. of California, School of Engineering, Berkeley, California 94720

This is a joint effort between the Universities of California at Berkeley and at Davis in which the objectives are to: 1. Evaluate the performance of existing soil-cement slope protection for earth embankments. 2. Characterize the erodibility and weathering of soil-cement mixtures under controlled laboratory conditions. 3. Critically review the suitability of the 'borrowed' durability test criteria for soil-cement when used for slope protection design. 4. Predict the field performance of soil-cement slope protection by conducting simulated model tests. 5. Suggest new design criteria for soil-cement slope protection for earth embankments, if appropriate.

The soil-cement laboratory and model studies will be carried out on the Davis campus, and the investigation of other chemical additives as soil stabilizers for slope protection shall be conducted on the Berkeley campus.

**SUPPORTED BY** U.S. Natl. Science Foundation

**9.0026, ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLEN-DORA, CALIFORNIA**

**F.B. LEIGHTON**, Glendora City Government, Glendora, California

**Abstract:** Contents: General geology; (Geologic setting, Geologic earth units); Geologic features and processes influential in planning; (Dip slopes, landslides, rockfalls and soil failures, faults, seismic activity, expansive units, perched ground water, flooding, erosion and deposition, avoiding flood and mudflow hazards); Resource materials; (Sand, gravel and riprap, water resources, subbase and base materials); Geologic guideline to hillside development; Suggestions for a model building and grading code.

Pub. Oct. 69: 64p., NTIS No. PB - 195 930: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

**9.0027, SANTA CRUZ COUNTY COOP**

**E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

This study is undertaken to provide basic data necessary to the preparation of the Seismic Safety Element of the Santa Cruz County General Plan. Since sufficient data is presently available regarding flood plains and areas susceptible to seismic sea waves, it is the purpose of this study to provide maps and interpretive text identifying the location and relative magnitude of geologic hazards due to seismic faults and landslide

related to land development, and will provide a means for broad evaluations of consultant reports in support of development projects. Additionally, the geologic information provided by the study will help in identifying or anticipating fault and landslide problems, and will thus indicate where special needs exist for further and more detailed investigations.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**9.0028, EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION**

**E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

Identify, characterize and map the earthquake geologic hazards of the San Francisco Bay region. Develop criteria for recognition of geologic materials subject to landsliding, liquefaction and other ground failures resulting from earthquakes and refine techniques of estimating ground response to earthquakes for different geologic settings and seismic base motions. Prepare an active earthquake data system to compute local seismicity, ground base motion, natural period and amplification spectrum for ground materials, as well as probabilities of liquefaction, compaction, lateral spreading, landsliding and surface displacement along faults. This data system would provide the ability to quickly prepare and update regional or local seismic risk maps for planners and others concerned with earthquake hazards in the Bay region.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**9.0029, GEOLOGY OF THE POINT DUME QUADRANGLE AND THE LOS ANGELES COUNTY PART OF THE TRIUNFO PASS QUADRANGLE, LOS ANGELES CO. COOPERATIVE, CALIFORNIA**

**R.H. CAMPBELL**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

The project has two basic objectives: (1) General-purpose geologic maps and sections at a scale of 1:12,000, with emphasis on identifying and evaluating potential geologic hazards. Mapping of Point Dume quadrangle is complete; mapping of Triunfo Pass quadrangle and topical studies continue. Landslide classification and characterization will be presented on slope maps at a scale of 1:24,000. (2) Geologic maps and sections at a scale of 1:24,000 combined with those of adjoining areas (see project 9550-00626), to form the basis of a comprehensive report on the geology of the central Santa Monica Mountains.

The project area is in the Santa Monica Mountains, northwest of the Los Angeles basin and southwest of the San Fernando Valley, both of which are densely urbanized. To the north and northwest lie the rapidly developing areas of southern Ventura County. There is much land-use planning by public and private agencies, and, as about 70 percent of the area slopes at 50 percent (26 degrees) or more, slope stability is a major concern.

In the project area, the mountains constitute a west-trending block of Late Cretaceous to middle Miocene sedimentary and volcanic rocks. Those strata were cut by gently dipping detachment faults and northeasterly-trending high-angle faults, and further disrupted by the forcible intrusion of basalt and andesite sills, all during middle Miocene time. The mountain block is now tilted northward, bounded on the

The Monterey Bay project is concerned with the geophysical and geological mapping of Monterey Bay, Monterey Canyon and fan, and the continental shelf and slope from south of Point Sur to Ano Nuevo Point in the north, along the central coast of California. Interpretation of the geophysical data which was collected by continuous marine seismic reflection profiling with a high resolution, .6 to 1 kj sparker, intermediate penetration, 13 to 33 kj sparker, high powered, 160 kj sparker, magnetic profiling with a marine proton precession magnetometer, and gravity profiling with a shipborne stable platform marine gravimeter, is being done presently. Interpretation of the geological data which consist of bedrock and sediment samples collected by dredging, gravity coring, vibracoring, and in situ sampling with a research submersible are continuing.

Principal objectives of this project are (1) to seismically map the geologic structures of Monterey Bay, to establish geology of the bay, its structure and tectonic history; genesis, thickness and depositional history of the sediments of the bay, (2) to determine the distribution and locations of fresh water aquifers in the northern portion of the bay, (3) to determine the origin of Monterey Submarine Canyon and its significance as it relates to the geology of the bay, (4) to map faults in Monterey Bay and along the shelf from Point Sur to Ano Nuevo Point and determine their significance as they relate to onshore geology, recent seismic events, and modern day working hypothesis such as sea-floor spreading, and (5) to delineate geologic hazards such as locations of slumps and possible submarine landslides. Areas of possible economical interests, such as sedimentary structures that may contain hydrocarbons and locations of possible commercially available sand and gravel deposits have been identified.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 9.0031, ALASKA GEOLOGIC EARTHQUAKE HAZARDS

G. PLAFKER, U.S. Dept. of the Interior, Geological Survey,  
Menlo Park, California 94025

States to which project pertains: Alaska.

The specific project objectives are to reduce and evaluate risk in Alaska from tectonic displacement, seismic shaking, and secondary geologic effects. A more general goal is to gain an insight into tectonic processes within the seismically active zone of southern Alaska.

Initially, research efforts will be concentrated in the highly seismic southern part of the State where most of the population and economic development are concentrated. This research will later be extended into the southeastern and central parts of the State. Geological research under this project will be closely coordinated with parallel geophysical projects by the Office of Earthquake Research.

The geologic studies will involve: 1) preparation of detailed maps of active surface faults and evaluation of geologic evidence for late Cenozoic fault movement; 2) delineation of coastal areas that may be subjected to major earthquakes characterized by large-scale regional tectonic elevation changes and assessment of the hazards related to such movements (notably seismic shaking, tsunamis, seiches, and regional warping); 3) identification and evaluation of secondary geologic hazards related to seismic shaking in critical areas of high population density and along transportation routes (such as landsliding, submarine sliding, liquefaction, landsliding and compaction); and 4) preparation (with OERCS) of a synthesis of pertinent data on the tectonic processes in the seismically active junction between the

within which earthquake hazards in sedimentary basins are evaluated.

SUPPORTED BY U.S. Dept. of Interior

#### 9.0032, GEOLOGY OF THE POINT BLANCK, CALIFORNIA

J. SCHLOCKER, U.S. Dept. of the Interior,  
Menlo Park, California 94025

States to which project pertains: California.

The project objectives are to prepare a geologic map of the area in order to learn more about the geology and history of the bedrock crust which underlies the Franciscan Formation, and to aid in land use planning in the area. Considerable pressure for urban development has been applied recently, for this area is only 2 miles from San Francisco. Thus the sheared melange blankets the Franciscan units such as the abundant, extensive, and highly deformed deposits and landslides will receive special attention. Radiolarian chert is especially thick and widespread in the southern part of the quadrangle. They are associated with spilites and basalts will be the subjects of special study. The southern border of an extensive and well defined unit lies within the quadrangle underlying the Franciscan up of radiolarian chert, sandstone and shale. The nature and origin of the melange will be determined by an intensive study of the border.

SUPPORTED BY U.S. Dept. of Interior

#### 9.0033, ACTIVE FAULTS AND GEOLOGIC HAZARDS FROM PT. MUGU TO WILMINGTON, CALIFORNIA

H.C. WAGNER, U.S. Dept. of the Interior,  
Menlo Park, California 94025

States to which project pertain: California.

Topical studies related to earthquake hazards in the California borderland, with geologic mapping as a major evaluation spinoff. Major objective of the project is to construct the depositional and structural sequence of the borderland in order to determine the age and kind of faults, and offshore faults as a means of evaluating the hazards of earthquakes, tsunamis, landslides, or slumps related to building construction or to major urban centers with high population growth. The geologic mapping will increase knowledge of offshore parts of the borderland and will provide a means of evaluating the subsurface economic resources (e.g., oil, gas, phosphate, manganese, oil and gas).

SUPPORTED BY U.S. Dept. of Interior

#### 9.0034, MALIBU BEACH QUADRANGLE, AN UNINCORPORATED PART OF THE SAN GABRIEL QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA

R.F. YERKES, U.S. Dept. of the Interior,  
Menlo Park, California 94025

States to which project pertains: California.

The project area is centered in the largely undeveloped Monica Mountains, immediately northwestern edge of the urbanized Los Angeles basin, and is therefore of intensive land-use planning by public and private agencies. Part of the mountains is underlain by a complex of dipping detachment faults, thrust faults, and other distributed bodies of easily eroded igneous rocks. The faults. The mountains have been de-

sion, such that about 80 percent of the area is underlain by slopes exceeding 50% (26 degrees). These characteristics have contributed to the formation of numerous extensive landslides.

The primary objective is to prepare general-purpose geologic maps at a scale of 1:12,000 (now about 75% completed), emphasizing geologic hazards. The geologic maps will be followed by slope-analysis maps at 1:24,000, which will combine data on slope-forming processes on a base map that shows percent of slope within a narrow range, the boundaries of the slope intervals to be based on land-use and grading-code criteria. The geologic maps and sections at 1:24,000 will finally be combined with those of adjoining areas (see Project 9550-00634) to the basis of a comprehensive report of the geology of the central Santa Monica Mountains.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0035, REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING**

G. GOODWIN, U.S. Natl. Aero. & Space Adm., Ames Research Center, Moffett Field, California 94035 (7470530)

The objectives are: (1) to analyze landslides and other geologic structures prone to mass movement using an infrared radiation imaging system, and (2) to help solve specific problems of several State of California agencies by obtaining infrared imagery of water and land features, and assisting in image interpretation. Large scale imagery is required for detailed analysis and correlation with carefully completed field studies. To determine those factors that influence soil and water surface temperatures, low altitude flights on a diurnal and seasonal basis using an infrared line scanner will be made. ERTS-1 imagery will be used along with CV-990 and U-2 underflight missions. ERTS-B thermal imagery will be used when available.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

**9.0036, DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA**

D.H. POOLE, Univ. of California, School of Physical Sciences, Riverside, California 92502

Abstract: Two forms of rapid mass wastage, mudflow and debris slide, are considered. Both forms of movement are studied in their environment of occurrence using a remote sensing approach. The two environments included Wildwood Canyon watershed in California and Davis Creek watershed in Virginia. Data sources include standard black and white aerial photography, Aero Ektachrome, and Aero Ektachrome Infrared (CIR) photography. A comparison of mass wastage phenomena in the two areas reveals many similarities in form and between the physical character of the drainage ways. In Wildwood Canyon maximum deformation was limited to several small tributaries and the main channel. Both channel and widespread slope destruction occur throughout the Davis Creek drainage Basin.

Pub. Aug 72: 56p., NTIS No. AD-748 642: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Navy

**9.0037, LIME SOIL STABILIZATION STUDY**

effectiveness of lime treatment to stabilize embankments, landslides and soft foundation soils. A report on the literature search phase of the study has been prepared. Laboratory testing and field testing will be done. Reports issued: 'Lime Soil Stabilization Study', T. W. Smith, M. L. McCauley, J. Puleo, January 1967. 'A Study of Lime-Reactivity of California Soils by Electrical Dispersion Method', K. Arulanandan, C. K. Shen, University of California Interim Report, November 1968.

Document provided to S.S.I.E. By the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**9.0038, EVALUATION OF 'ION EXCHANGE' LANDSLIDE CORRECTION TECHNIQUE - CALIFORNIA**

T.W. SMITH, State Div. of Highways, Sacramento, California 95814

The ion exchange technique, a chemical landslide correction measure, has been used on a landslide in northern California. The project will provide data on the landslide, the method of treatment, and evaluate the results of the treatment in terms of stabilizing the slide.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**9.0039, EVALUATION OF THE ION EXCHANGE LANDSLIDE CORRECTION TECHNIQUE**

R. MEARNS, State Materials & Res. Dept., Sacramento, California

Abstract: A technique for correcting landslides using a chemical treatment is discussed. Treatment of a specific landslide using the technique is described. The results of a monitoring program to determine the effectiveness of the treatment are presented and analyzed. The technique appears to be theoretically sound. Treatment of the landslide was simple and relatively inexpensive. The slide now appears stable, but this condition cannot be clearly attributed to the chemical treatment. Future use of the technique is recommended.

Pub. Jan 73: 37p., NTIS No. PB-220 370/1 PC \$3.75 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**9.0040, SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO**

G.O. BACHMAN, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The geology of the Socorro 2 degree quadrangle in central New Mexico is being compiled at a scale of 1:250,000. The principal objective is to provide a geologic base for a continuing study of the environmental geology of the region. This is part of a larger project to study the central Rio Grande trough in areas of major population centers. Emphasis is being placed on geologic studies of the Cenozoic fill within the trough where recent faulting, slope stability, ground and surface water, and waste disposal problems require geologic background for potential land use.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0041, GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA**

J.M. CATTERMOLE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: South Dakota

1:24,000. The maps of the Rapid City West and Rapid City East have been published in the Geologic Quadrangle Map Series in full color with a columnar section and text; the map of the Rapid City NW quadrangle was scheduled to be printed in 1973 and should be released early in 1974.

The final product of the project is a two part Bulletin covering the entire urban area of Rapid City: the first part will describe the geology, structure and stratigraphy of the three quadrangles; the second part will detail foundation conditions, expansive soils, construction materials, landslides, and physical characteristics of each formation and the pertinent effects related to planning engineering projects.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0042, DENVER METROPOLITAN AREA, COLORADO**  
*R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

States to which project pertains: Colorado.

The project objective is to prepare detailed general-purpose geologic maps of eight quadrangles covering the major part of the Denver metropolitan area. These maps, at a scale of 1:24,000, are designed to provide basic information on the geologic factors pertinent to maximum utilization of land in a rapidly expanding area of urban development. Information to be provided concerns the engineering properties of the surficial and bedrock units, location of potential hazards such as landslides, areas subject to flooding, areas subject to possible earthquake damage, areas of poor foundation conditions, and the location and extent of sand and gravel deposits necessary for construction aggregate materials.

The geologic maps, each including a brief descriptive text, are to be released first in open files and subsequently published in the Geologic Quadrangle Map Series. The geologic map of the Parker quadrangle was published in 1972 as the first sheet in a special Folio of the Parker quadrangle. Thirteen additional single-concept maps of the quadrangle have been or will be published in the near future to complete the Folio. The enthusiastic acceptance of the Parker Folio by planning commissions and public officials have prompted plans to issue some similar interpretive maps for the adjoining Highlands Ranch quadrangle.

A comprehensive geologic report covering all eight quadrangles is planned for the Bulletin series.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0043, SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA**

*R.D. MILLER, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

The Juneau project started as part of a coastal communities program of earthquake hazard studies following the March 1964 Alaska earthquake. The original primary objective was to investigate and evaluate potential hazards from earthquakes as a result of the geologic setting. The study has been broadened to include other natural geologic events and to try and relate man's use of the land to the existing geologic environmental conditions. Field mapping was completed in 1971.

The project consists of differentiating and mapping surficial deposits and performing physical properties tests on selected samples. Development of raised marine and glaciomarine deposits, glaciofluvial, glacial, and lacustrine deposits is coupled to the geologic history, which in part influences the dif-

development to hopefully avoid geologic pitfalls into account the geologic influence on the environment as relative stability of deposits in case of severe earthquakes, areas of known or potential rockfalls and avalanche-prone areas, and engineering foundation conditions.

A geologic map with text and interpretive transparencies was released to open file in May 1972. A U.S. Geological Survey Bulletin, 1394-C, was published in 1973 that describes the glaciomarine deposits a formation name, the Gastineau Formation. A geologic map with tabular text and interpretation is being processed for publication in the Miscellaneous Investigations Map series of the Geological Survey.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0044, DENVER-FRONT RANGE URBAN CORRIDOR**  
*T.W. OFFIELD, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

States to which project pertains: Colorado.

Application of remote-sensing techniques in the Denver-Front Range area Colorado includes delineation of geologic structure and landslide hazards by use of thermal-infrared imagery, discrimination of rock types, alteration areas, and mineral districts by use of aircraft and satellite remote sensing data, and laser filtering of photographic imagery for enhancement of linear structure elements.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0045, MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR**

*K.L. PIERCE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

States to which project pertains: Colorado.

The prime objective is to prepare maps showing the distribution, thickness, and infiltration characteristics of the mantle of hard crystalline rock in the mountainous Front Range Urban Corridor. The map units will be defined to provide information concerning the suitability of the regolith (soil) for disposal of septic tank effluent water, surface or ground water contamination, and the development of the area possible by power machinery without the need for blasting. Also mapped (with Water Resources Division) will be the areas affected by flash floods, seasonally saturated ground, and landslides.

Mapping will be done for publication at a scale of 1:24,000. A period of about 2 years. Water-well logs and seismic data will be used to gain information on the character and thickness of the regolith.

Scientific benefits will include a better understanding of the geomorphic history of the region, and the nature of the geologic setting on terrains of different age and different rock types.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

**9.0046, SNAKE RIVER BASIN, PART F - SOUTHWESTERN PART, NORTHWEST MARGIN - IDAHO**

*B. SKIPP, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225*

The project involves the mapping, to be compiled at a scale of 1:24,000, of all or parts of thirty 7 1/2 quadrangles, situated in the southwestern part of the northwest flank of the Snake River plain. The chief objectives are: (1) the use of the little known Late Paleozoic rock sequence to determine stratigraphic and paleogeologic studies; (2) the determination of the geologic history of the area.

flows along the north edge of the Snake River Plain; (4) the providing of a geologic framework for environmental studies in the region; (5) the study of recent faulting and landslide distribution possibly related to earthquake activity; and (6) the supplying of a well-mapped area adjacent to Snake Plain which will aid in interpretation of gravity and aeromagnetic surveys across the plain.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**9.0047, EVALUATION OF CRITERIA FOR LANDSLIDE ANALYSIS AS PRESENTED IN THE U.S.G.S.**

**UNKNOWN**, U.S. Dept. of the Interior, Bureau of Reclamation, Denver, Colorado 80225

**Abstract:** A landslide investigation was made of Lake Roosevelt during the period April 28 to 30, 1969. Upon completion of the inspection trip, the Project was requested to investigate the reliability of empirical criteria established by former Project Geologist, Mr. F.O. Jones, for evaluating landslides. Fifty-four areas were selected for evaluation by applications of Jones' empirical equations (location map, page 4). Thirty are active landslide areas, some of which have developed since the Jones study was made. Eighteen locations are considered potential landslide areas. Six areas which appear stable were selected as a check against the empirical predictions. The fifty-four locations selected are considered representative of the reservoir rim.

Pub. Jan 70: 29p., NTIS No. PB-194 680: HC \$3.00 MF \$0.65.

**SUPPORTED BY** U.S. Dept. of Interior - Bu. Reclamation

**9.0048, HAMILTON 2 DEGREE**

**J.D. WELLS**, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Montana and Idaho.

Prepare a geologic map of the Hamilton 2-degree sheet at 1:250,000 scale, integrating the past, current, and future pertinent mapping done by industry, universities, and State and Federal agencies, and incorporating geologic, geochemical, isotopic, and geophysical data as a basis for evaluation of land use and mineral potential. Special purpose interpretative maps and reports will be prepared of appropriate areas where potential hazards such as landslides, unstable foundation material, faulting, earthquakes, and flooding are present. An evaluation of known and potential mineral resources of base and precious metals and fluorite along the margins of the Idaho Batholith and stratabound copper in the Beltian strata will be made. These data will contribute to the general body of geologic knowledge of the northern part of the Idaho Batholith and contribute in developing the regional structural, stratigraphic, magmatic, metamorphic, and erosional patterns. They will further provide a proper basis for land use planning for the diverse interests in this area of urban development in an outstanding recreational area.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**9.0049, PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY**

**UNKNOWN**, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

**Abstract:** A comprehensive guide to a study of the 9-county San Francisco Bay Region describes a 4 year research-demonstration study conducted jointly by the Geological Sur-

veys and earthquake hazards, landslides and slope instability, physical and chemical properties of San Francisco Bay and its circulation patterns, water-quality and pollution, areas subject to flooding, water supply and waste-disposal systems, and available mineral and water resources. Planning program elements described include state-of-the-art review and analysis, a feasibility study of incorporating earth-science data into urban planning information systems, and application and demonstration studies.

Pub. Oct. 71: 121p., NTIS No. PB-206 826: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**9.0050, REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY**

**J. DENOYER**, U.S. Natl. Aero. & Space Adm., Headquarters, Washington, District of Columbia 20546 (7370892)

These studies will determine the potential applications of the present state-of-the-art of remote sensing to the Army Corps of Engineers mission. The disciplines involved are geology, biology, ecology, estuarine processes. Activities include vegetation classification, chemical and thermal pollution analysis, river turbulent cell analysis, determination of surface and subsurface geologic conditions, location of landslide prone areas, analysis of sediment deposition, siting of potential project locations, identification of land use patterns, ocean circulation tidal currents and tidal flushing, and monitoring the impact of construction on the surrounding environment. It is reasonable to assume that color, IR, and multispectral photography, and SLAR and scanner imagery from aircraft, can significantly enhance existing data, thereby expanding the basis for water resources management decisions.

**SUPPORTED BY** U.S. Natl. Aero. & Space Adm.

**9.0051, EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON**

**D.H. GRAY**, Univ. of Michigan, School of Engineering, Ann Arbor, Michigan 48106

The broad objective of this study is to examine the extent to which deforestation and current logging practices affect slope stability on steep, mountain sites. This approach differs from studies commonly undertaken which have chiefly investigated the effects of forest practices on surface runoff, soil erosion and subsequent productivity.

Specific objectives are as follows: 1. To determine to what extent removal of the forest cover affects the following physiographic and soil property variables: A. Soil moisture stress, B. Soil shear strength, C. Creep susceptibility; D. Slope surcharge. 2. To determine how and to what extent changes in the above variables affect the deep seated stability of a slope by calculating and measuring: a. Factors of safety against sliding, b. Soil mantle creep rates.

Steep slopes in two watersheds in the H. J. Andrews Experimental Forest in the Cascade Range of Central Oregon have already been instrumented. In addition, it is planned to instrument three sites on slopes of the Cascade Ranges of Washington.

**SUPPORTED BY** U.S. Natl. Science Foundation

**9.0052, EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES**



forest cover appears to affect the deep seated stability in two principal ways, viz., by modifying the hydrologic regime in the soil mantle and by mechanical reinforcement from its root system. This report describes a theoretical stability analysis which should make it possible to predict the stability of a forested slope and assess the probable consequences of denudation on a more rational basis. A field study presently being conducted in central Oregon is also described. Slopes have been instrumented there in order to obtain quantitative data on soil moisture stress and soil mantle creep before and after clear-cutting.

Pub. Sep 69: 74p., NTIS No. PB-191 635: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Natl. Science Foundation

#### 9.0053, ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI

D.M. KEADY, State Geol. Survey, Jackson, Mississippi

Abstract: Mass wasting in the Tombigbee Sand Member of the Eutaw Formation (Upper Cretaceous) is not an uncommon occurrence on steep bluffs developed on this unit in northeastern Mississippi. The most recent documented slide occurred on Monday, April 27, 1970, in the vicinity of the small man-made Ackers Lake, approximately five miles (8 kilometers) north of Aberdeen. This report is a description of the slide and an interpretation by the authors of the factors involved in its development.

Pub. 1973: 24p., NTIS No. PB-228 697/9: PC \$4.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

#### 9.0054, ROCK STRENGTH FROM FAILURE CASES

J.F. REDLINGER, U.S. Army, Missouri River Engr. Div., Omaha, Nebraska

The purpose of this research is to obtain needed information on reliable values of shear strength of in-situ rock masses for use in design problems involving high rock slopes, rock bolting treatments, sliding of structures on rock foundations, tunnel and portal stability problems, etc. The record of past rock slope failures indicates that these failures have been controlled by the strength of key rock defects (joints, weak seams, faults, etc.). A related laboratory study at MRD has succeeded in developing techniques to appraise the frictional contribution to joint strength (or other defect) and in pointing up the importance of this additional strength or 'cohesion contribution' that results principally from the degree of roughness or interlocking of the joint surface. Studies by Patton at the University of Illinois, and views frequently voiced at the 1966 International Rock Mechanics Congress in Portugal and subsequent symposia in the U.S., have emphasized the severe lack of information regarding this cohesion contribution and strongly suggest that it may be best appraised after backfiguring rock failures for stresses acting in-situ at time of the failure.

Plans for the immediate future include a field study of known rockslides to determine slope geology, geometry and ground water conditions, failure mass geometry, and movement history. The study will be conducted in two areas: (1) hard rock slopes, and (2) soft rock slopes. Shear strength parameters will be calculated for the limiting equilibrium conditions of the failure masses. The strength parameters obtained in this manner are to be applied as guidelines in the design of stable slopes in rock.

SUPPORTED BY U.S. Dept. of Defense - Army

This research project seeks to understand variations in tree-ring growth in trees on certain debris slides in the High Plateaus of Utah and to relate these variations to slope movement patterns. Narrow growth rings produced by tilting and by trauma of root shear will be related to movement determined by other methods, such as aerial photographic analysis of the debris slides. Minor ecologic and climatic factors affecting tree-ring characteristics are expected to be removed by reference to a control group of trees growing on nearby stable slopes. Tree-ring data from trees with disturbed growth will be treated statistically and computer maps generated to display tree locations at different points of time, hopefully resulting in a slope movement chronology that can be tied solely to tree-ring growth information. The patterns of movement and dating of events by tree-ring methods may allow inferences as to whether surge mechanisms operated within the debris slides.

SUPPORTED BY U.S. Natl. Science Foundation

#### 9.0056, THE INFLUENCE OF CLAY MINERALS ON SURFICIAL EARTH MOVEMENTS

P.F. KERR, Columbia University, School of Arts, New York, New York 10027

Abstract: The report is a condensed summary based on studies extending over 10 years and covered by 16 publications. Mention is made of the clay-water situation, the role of clay minerals in landslide formation, the range of speeds in landslide movement, the fluid movement of clay (thixotropy), and underflow in landslides. Discussion is included on theories of landslide origin.

Pub. Mar 72: 24p., NTIS No. AD-766 209/1: PC \$2.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Air Force

#### 9.0057, LANDSLIPS IN SOUTHEASTERN OHIO

K.R. EVERETT, Ohio State University, School of Agriculture, Columbus, Ohio 43210 (OHO00401-S)

Objective: Apply information obtained at EORDC on landslide environment, mechanisms, rates and pattern of movement to a broader area of SE Ohio. Investigate relationships between landslips and landuse and develop regionally applicable recommendations for their control.

Approach: Areas of farm slope instability will be plotted on topographic maps and/or air photos to determine actual acreages affected in Noble and adjacent counties. As many of these areas as practicable will be examined to substantiate similarities or departures in form and mechanics from those studied at EORDC. Past and present landuse practices which may have contributed to such mass-movements will be evaluated and amendment recommendations formulated. A number of forested slopes will be studied to finally evaluate the value of reforestation in stabilizing the slopes of SE Ohio.

Progress: A final report covering results from 1967 through 1972 was prepared and submitted to OARDC in June 1972 under the title 'Slope Movement and Form in Southeast Ohio'... Vertical velocity profile cylinders inserted in the slope at site 2 in July 1971 were excavated in November 1972. Plots of these cylinders indicate both creep and shear motions have occurred and their amount is in close agreement with measured surface velocities and microtopography...Regional documentation of landslips in Noble county from air photographs has been initiated.

SUPPORTED BY Ohio State Government - Columbus

**9.0058, DEVELOPING REMOTE SENSING TECHNIQUES FOR AIDING PREDICTION OF LANDSLIDES****O.W. MINTZER**, Ohio State University, School of Engineering, Columbus, Ohio 43212

The objective of this investigation is to develop applications of remote sensing techniques for locating incipient landslides and forecasting conditions relative to occurrence. Procedures: The data are to be collected by means of ground and aerial surveys. Soil and rock samples along with moisture content to appropriate depths are to be collected. Color photography and thermal infrared imagery are to be collected on a pre-arranged schedule coordinated with ground data collections. These data combined with the correlative geologic, soil, topographic and drainage features will be analyzed in order to guide the study of conditions that cause landslides. Progress: The initial phase of establishing regions (sites) where the investigation will be concentrated are nearing completion. Selection of remote sensing techniques for use in the study is complete. Establishing the appropriate correlative procedures is in progress.

**SUPPORTED BY** Ohio State University**9.0059, STABILIZATION OF STEEP LAND SLOPES - OHIO****G.O. SCHWAB**, Ohio State University, School of Agriculture, Columbus, Ohio 43210

**Objective:** To determine identifying potential landslide areas from simple soil and topographic characteristics. To develop and evaluate methods for stabilizing land slopes by such practices as diversion channels, surface drains, subsurface drains, and vertical wells.

**Approach:** Analytical, model, and field studies will be conducted to develop practical and economical measures and methods to reduce or to stabilize potential or existing landslides in southeastern Ohio. Detailed field measurements will be made at selected sites on the Eastern Ohio Resource Development Center. Proposed solutions will be developed primarily from laboratory and analytical models. Drainage designs which appear promising will be installed at field sites. Soil, topographic, and other features will be related to control measures. Basic information for extending recommendations to similar areas will be developed by coordinating the results with those from State Project 401.

**Progress:** Measurements were made on concrete bench marks installed on or near the bench terrace which was constructed in 1969. Soil movement horizontally and vertically was insignificant during the previous year. About 2,100 feet of two-inch diameter plastic drain tubing was installed on two hillsides at the Eastern Resource Development Center near Caldwell. The drains were installed with a mole plow at a depth of about two feet on slopes which showed evidence of considerable soil movement. Twenty-two bench marks were installed to measure horizontal and vertical soil movement. These benchmarks were constructed by placing 4 feet of 2-inch diameter plastic tubing in a 6-inch post hole and filling the space with sand.

**SUPPORTED BY** Ohio State Government - Columbus**9.0060, ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO****T.H. WU**, Ohio State University, School of Engineering, Columbus, Ohio 43212

dy. Soil tests will be conducted in the field and in the laboratory.

**SUPPORTED BY** U.S. Natl. Science Foundation**9.0061, MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO****W.F. NORELL**, State Dept. of Transportation, Columbus, Ohio 43215

Stereo photo keys are being developed for the use of stereoplotter operators in detecting and mapping the following foundation problem areas: landslides, landform voids due to mining, soft foundations, sinkhole topography, lacustrine deposits. Reports issued: 'Air Photo Patterns of Landslides In Southeastern Ohio', W.F. Norell, January 1966. 'Coal Outcrop and Overburden Mapping with Kelsh Plotter', W.F. Norell, Highway Research Record No. 109. 'Air-Photo Patterns of Subsurface Mining in Ohio', W.F. Norell, December 1968. 'Ohio Photogrammetric Research Solves Highway Foundation and Right of Way Problems', Digest of Third Interim Report of Research by Wayland F. Norell, Public Roads, Vol. 36, No. 9, August 1971.

**SUPPORTED BY** U.S. Dept. of Transportation - F.H.A.**9.0062, EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS****R.L. FREDRIKSEN**, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta., Portland, Oregon 97208

**Abstract:** In two steep headwater drainages, landslides were the predominant source of increased sedimentation of streams following timber harvest. Patch-cut logging with forest roads increased sedimentation compared with a control by more than 100 times over a 9-year period. Landslide erosion was greatest where roads crossed high gradient stream channels. In an adjacent clearcut watershed with no roads, sedimentation increased three times that of the control.

Pub. 1970: 19p., NTIS No. PB-194 987: MF \$0.65.

**SUPPORTED BY** U.S. Dept. of Agriculture**9.0063, DEVELOPMENT OF CRITERIA FOR RECOGNIZING & IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED BY REMOTE SENSOR RETURNS - NORTH CAROLINA****D.J. POOLE**, East Tenn. State University, Remote Sensing Institute, Johnson City, Tennessee 37602

**Abstract:** The study shows that the criteria developed from photographic images depicted by remote sensing photography from NASA's North Carolina Test Site is based largely on pattern, color contrast, and geometric form. Patterns are best reflected in the erosional forms of sheet wash, rill wash, and gully, and in the mass wastage forms of soil creep and rock fall and rock creep. Color contrast is significant in differentiating all erosional and mass wastage forms of slope failure. The color contrast between an object and its background is frequently the only means of establishing recognition. Geometric form is relied upon most often in recognizing and establishing the identity of the rapid forms of

## 10. LAND SUBSIDENCE

### PUBLIC ASSISTANCE

#### 10.0001, COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS

*W.L. TROCK*, Texas A & M University System, School of Agriculture, College Station, Texas 77843

While the fact of subsidence is known and appreciated, little effort has been devoted to a determination of costs of this phenomenon in the area. The private costs of protection, salvage and loss are not well known, and little more is known about public expenditures made necessary by a sinking land area. The evaluation of proposals to combat the problem--proposals ranging from the creation of alternative water supplies to purchase of affected lands--is not possible without measures of the cost of subsidence. The benefits of corrective measures will be the costs saved, or no longer incurred. So it is important that private and public costs be ascertained. It will be the purpose of this project to determine the past and existing costs of land subsidence and to estimate these costs in the future if measures to curtail withdrawal of water are not taken.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

### DISASTER MITIGATION

#### 10.0002, GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS

*J.B. SEED*, Calif. Inst. of Technology, Graduate School, Pasadena, California 91109

Abstract: The report summarizes the findings of the Natural Hazards Review Panel whose mission it was to investigate the nature and magnitude of the threats posed to Naval bases by earthquakes and earthquake-related natural hazards including tsunamis, seiches (and the accompanying flooding), landslides, mudflows and soil foundation failures which may result from earthquakes. In addition to citing specific problems for Naval bases in the San Francisco, San Diego and the Manila areas, the introduction to this report recommends conducting a rapid visual survey initially to pinpoint the nature of various danger areas. It then recommends the follow-on procedure leading to various strategic and engineering decisions which will provide the required degree of protection to insure Fleet Operational Readiness and to provide cost effectiveness in protecting the Navy against serious earthquake damage.

Pub. Jan. 74: 45p., NTIS No. AD-778 005/9: PC \$3.25 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 10.0003, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

*J.T. ALFORE*, State Div. of Mines & Geology, Sacramento, California 95814

Abstract: This report recommends loss-reduction measures for

sion activity, expansive soils, fault displacement hazards, tsunami hazards, and subsidence. It describes the nature, distribution, and magnitude of the problem, as well as costs and effectiveness of reduction measures, and agencies responsible for the measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: PC \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 10.0004, COAL MINE DEFORMATION STUDY, SOUTHERN COLORADO

*C.R. DUNRUD*, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Colorado.

Determine which geologic features and engineering factors control mine deformation problems, such as (1) roof falls, (2) roof bursts, and (3) coal mine roof bursts, so that future mining can be safer and with a minimum of damage to the environment. 1. Make a geologic map of proposed or current coal reserves. 2. Make a geologic map of proposed or current coal reserves. 3. Make a geologic map of proposed or current coal reserves. 4. Study processes of natural arches and lateral confinement and in various geologic settings to serve as an aid in designing more stable openings.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 10.0005, DEVELOP METHODS FOR PREDICTING COMPONENTS OF GROUND MOVEMENTS IN COAL MINE WORKINGS

*D.Q. FLETCHER*, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

To develop structural analysis procedures for predicting numerical values of vertical displacements horizontal and curvature at specified points in the overlying arbitrary configuration of the extraction volume into account the geometry and structural properties of rock strata.

Subsidence measurements and structural properties formulated from new, on-going and past research be used to further develop an existing computer program with a view to formulating the mathematical properties such that predicted subsidence components with measured components.

SUPPORTED BY U.S. Dept. of Interior - Bureau of Mines

#### 10.0006, MICROSEISMIC DETERMINATION OF MINE ENTRY STABILITY

*R.D. MUNSON*, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The primary objective of this program is to determine

bumps, 2) Investigate the possibility of employing a surface or nearisurface detector network, 3) Determine the ability of the abutment pillar in relation to encroachment of final mining, and 4) Relate the 'noise' generated by subsidence to stress concentrations and variations in the strength of the overlying strata.

**SUPPORTED BY** U.S. Dept. of Interior - Bureau of Mines

**10.0007, ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY**

*F.D. WRIGHT*, Univ. of Kentucky, School of Engineering, Lexington, Kentucky 40506

The purpose of this study is to measure subsidence and relate ground movements and ground pressures resulting from shortwall mining of coal to the physical properties and geologic structure of the coalbed and enclosing strata. These relationships will be analyzed in an attempt to develop methods for predicting the effects of shortwall mining on ground behavior under varying physical conditions. The work will include complete physical property testing of all samples and drill cores, complete instrumentation, monitoring and data collection at two underground test sites, drilling and instrumentation of vertical boreholes; and the reduction of all data collected.

**SUPPORTED BY** U.S. Dept. of Interior - Bureau of Mines

**10.0008, STATUS OF LAND SUBSIDENCE DUE TO GROUND-WATER WITHDRAWAL IN MISSISSIPPI**

*D.M. KEADY*, Mississippi St. University, School of Arts, State College, Mississippi 39762

The objective of this study is to determine the status of subsidence due to ground-water withdrawal in the Mississippi Gulf coastal area. Areas where subsidence is suspected will be examined for evidence of subsidence, such as changes in elevation of well established bench marks and features produced by subsidence. Recommendations will be made concerning future development of ground-water supplies in areas where subsidence may pose problems.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

**10.0009, DETECTION OF SUBSURFACE OPENINGS - INDIANA, MISSOURI**

*E.R. BATES*, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Purpose of study/investigation:** To develop a method for locating and delineating solution phenomena (cavities, sinks, joints, etc.) in karstic terrain.

**Approach or plan:** Assess existing and remote sensing capabilities and limitations by means of performance tests and evaluations of new and prototype equipment. Restrictions or limitations of specific techniques will be evaluated as to effective penetration distances and resolution capabilities.

**Progress to date:** An extensive literature survey revealed that electrical resistivity (Bristow method) offered the most promise for detecting subsurface openings. Good results were obtained detecting air-filled cavities using the Bristow method in the karst area of Indiana. It was also determined that the lapies and grike structure common to this area (Indiana) presented problems of interpretation that required revisions in procedures for analyzing the data. Resolution and effectiveness of modified (Bristow) techniques and analysis

**10.0010, STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS**

*J.G. JACKSON*, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

To determine the effect of percent saturation on wave propagation phenomena in sands, in order to assess the effect of the presence of groundwater on free field stresses and motions caused by a nuclear blast, and to investigate liquefaction potential of soils under the combination of outrunning and locally airblast-induced ground shock. Ground shock due to earthquakes has caused the failure of conventional structures by liquefaction (the formation of a quick-sand conditions), the potential of nuclear blast induced ground shock for causing failure of military installations will be investigated. The relevance of this work is the use of its results for construction of protective structure facilities to prevent such failures and in target analyses as a means of destroying enemy facilities.

A series of wave propagation experiments will be conducted on a medium dense sand in the small blast load generator in which the percent saturation, groundwater table position and initial pore pressure will be varied to determine the effect on free field stress and motion, when high intensity airblast surface loading pulses and low frequency oscillatory base motions are applied to the soil specimens. Movement of inclusions covering a wide range of density will be monitored in order to detect any tendency for liquefaction to occur. If possible, an experiment will be designed for a future HIE field test.

**Supporting agency address information:** OCE Waterways Experiment Station, Vicksburg, Mi. 39180

**SUPPORTED BY** U.S. Dept. of Defense - Army

**10.0011, LAND-SURFACE SUBSIDENCE, BAYTOWN AREA, TEXAS**

*R.K. GABRYSCH*, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

**Purpose:** The objective of this study is to determine rates and amounts of subsidence and to predict the rate and amount of subsidence for planning, construction, and maintenance of the proposed levee or some other protective measure.

**Methods:** Data on the relation of pressure decline to compaction would be collected and form the basis for determining the amount and rates of subsidence. These data include inventories of ground-water pumpage and oil and gas production and delineation of pressure decline due to each. A study would be made of the sub-surface deposits with the use of drillers' and electrical logs to determine clay and sand-bed thicknesses and composite clay thickness. Ten wells would be drilled to obtain clay cores, to install core pressure measuring devices in clays, to measure pressure heads in sands, and install compaction monitoring equipment. Water-level measurements would be obtained to relate with data from a releveling program initiated by the Corps of Engineers.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

**10.0012, LAND-SURFACE SUBSIDENCE, TEXAS CITY AND SEABROOK AREAS, TEXAS**

*R.K. GABRYSCH*, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

**Purpose:** The Corps of Engineers, in their concern for losses caused by hurricane flooding, has developed protection

gineers began structures in areas of subsidence. Because of the magnitude and rates of subsidence shown by periodic leveling (1943, 1954, 1959, 1964, and 1971) in some areas, it has become more important than ever to consider subsidence. The objectives of this study are to predict amounts and rates of subsidence for planning, constructing, and maintaining the levees and holding ponds used for protection.

**Methods:** Existing data on geology, hydrology, groundwater, and oil production, water levels and declines in water levels, would be collected and analyzed. Undisturbed samples would be taken from test holes and analyzed for consolidation characteristics and permeability. Observation wells would be installed to determine existing pressure profiles and reaction with time. Borehole extensometers would be constructed. Compaction of the top 1,500 feet of material would be monitored at the Seabrook site and of the top 900 feet at the Texas City site.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 10.0013, CONTINUING QUANTITATIVE GROUND-WATER STUDIES IN THE HOUSTON DISTRICT

**A.G. WINSLOW**, U.S. Dept. of the Interior, Geological Survey, Austin, Texas 78701

**Purpose:** To continue with appropriate modifications of the basic data collection program of the aquifers underlying the Houston district and thus provide the area with current, up-to-date information on its ground-water resources.

**Methods:** Operate and maintain ground-water level and subsidence network as follows: Observation wells, 6 recorder, 500 non-recorder; 1 compaction recorder. Conduct pumping tests on new large-capacity wells; conduct inventory of annual municipal, industrial, and irrigation pumpage; collect 92 water samples for chemical analysis; continue preparation of well-inventory records for publication; and analyze, interpret, and correlate all data collected with previously collected data.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

### HAZARD REDUCTION

#### 10.0014, ARIZONA EARTH FISSURE INVESTIGATION

**C. WINIKKA**, State Highway Department, Phoenix, Arizona 85007 (2R63206094)

Land subsidence, which is occurring in agricultural areas of Arizona due to declining levels of groundwater, is causing the formation of numerous earth fissures. Very little information has been recorded concerning these fissures which generally occur in the desert adjacent to the agricultural land. Fissures exist across interstate highways, railroads, in improved areas, and in cultivated land. Aerial photography, field inspections, analysis of level lines, and ground water levels are being studied to define the extent of the problem.

Document provided to S.S.I.E. by the H.R.I.S.

**SUPPORTED BY** U.S. Dept. of Transportation - F.H.A.

#### 10.0015, MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA

**L.A. BEYER**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

Research with the aid of borehole gravity density and porosity logs: (1) comparisons with core analyses, gamma-gamma logs, sonic or acoustic logs and well velocity surveys; (2) various geologic problems including causes of anomalous low density shales, density variations associated with thrust or reverse faulting, basement fault and basin definition, and oil dome exploration; (3) relationships between lithology, petrophysical characteristics, oil and gas accumulations, and post-depositional history of sedimentary rocks in selected U.S. oil fields; (4) the interpretation of surface gravity maps and seismic surveys; (5) the study of ground water systems and ground subsidence due to fluid withdrawal; (6) the engineering systems and ground subsidence due to fluid withdrawal; (6) the engineering properties of surficial sediments.

**Research and development of borehole gravity instrumentation:** (1) miniaturized borehole gravimeter, (2) borehole gravity gradiometer.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 10.0016, ALASKA GEOLOGIC EARTHQUAKE HAZARDS

**G. PLAFKER**, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: Alaska.

The specific project objectives are to reduce and evaluate risk in Alaska from tectonic displacement, seismic shaking, and secondary geologic effects. A more general goal is to gain an insight into tectonic processes within the seismically active zone of southern Alaska.

Initially, research efforts will be concentrated in the highly seismic southern part of the State where most of the population and economic development are concentrated. This research will later be extended into the southeastern and central parts of the State. Geological research under this project will be closely coordinated with parallel geophysical projects by the Office of Earthquake Research.

The geologic studies will involve: 1) preparation of detailed maps of active surface faults and evaluation of geologic evidence for late Cenozoic fault movement; 2) delineation of coastal areas that may be subjected to major earthquakes characterized by large-scale regional tectonic elevation changes and assessment of the hazards related to such movements (notably seismic shaking, tsunamis, seiches, and regional warping); 3) identification and evaluation of secondary geologic hazards related to seismic shaking in critical areas of high population density and along transportation routes (such as landsliding, submarine sliding, liquefaction, landspreading and compaction); and 4) preparation (with OERCS) of a synthesis of pertinent data on the tectonic processes in the seismically active junction between the transform fault system in southeastern Alaska and the northeastern extension of the Aleutian arc tectonic regime into south-central Alaska, to provide a broad framework within which earthquake hazards in southern Alaska can be evaluated.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 10.0017, SUBSIDENCE AND RELATED ASPECTS OF GEOTHERMAL SYSTEMS

**B.E. LOFGREN**, U.S. Dept. of the Interior, Geological Survey, Sacramento, California 95814

Subsidence and ground movement frequently accompanies the intensive withdrawal of formation fluids. These effects are

S. To measure the stress-strain parameters of these areas, and relate them to the extraction and injection of geothermal fluids is of major concern in the exploitation of geothermal fields

To conduct research on vertical and horizontal displacements and land-surface changes caused by geothermal extractions, fluid injections, induced subsurface pressure gradients, and formation temperature changes, to differentiate displacements and changes caused by geothermal development from those related to tectonic and near-surface effects; to analyze and interpret pertinent hydrologic, geodetic, geophysical, and geologic data as a background for this investigation, and attempt to relate geothermal changes to the regional geology; to obtain stress-strain parameters of the geothermal system.

In cooperation with other agencies, establish a network of bench marks around centers of geothermal extraction and injection. These to be accurately surveyed periodically to measure horizontal and vertical movement. Determine stress-strain parameters of the geothermal system, and relate these to fluid and heat withdrawals. Relate surface movements to microearthquake and geophysical data, and attempt to define the mechanics of the subsurface geothermal system.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 10.0018, LAND-SUBSIDENCE STUDIES IN CALIFORNIA - TO STUDY THE EXTENT, MAGNITUDE R

J.F. POLAND, U.S. Dept. of the Interior, Geological Survey, Sacramento, California 95814

In numerous areas of severe ground-water overdraft, effective overburden stresses are increased as much as 50 percent, causing significant compaction of the aquifer system and consequent subsidence of the land surface. These changes create economic and engineering problems in the operation of the ground-water basins and in construction and maintenance of water-transport structures - especially major canals. Stress increases in an artesian system result from either a reduction in artesian head or a rise in the overlying water table.

To study extent, magnitude, rates, and causes of land subsidence in California, to furnish criteria for estimating the amount of subsidence that would occur under assumed hydrologic change, to determine whether subsidence is reversible in part and to suggest ways for stopping or ameliorating subsidence.

Detailed study of areas of active subsidence in California, relating measured subsidence and compaction or expansion of the aquifer system to the pertinent hydrologic and geologic parameters. Compaction and water-level recorders or gages are maintained at about 30 sites. Subsidence and rate maps prepared for periods between available leveling data. Laboratory testing of core samples to obtain hydrologic and engineering properties of aquifer systems. This is a companion project to mechanics of aquifer systems research project PC-57-075-F.

Based on the 1970 releveing in the southern San Joaquin Valley by the NOS (formerly C&GS), we prepared subsidence maps that indicated maximum subsidence of 3.0 feet, 1962-70, in the Tulare-Wasco area, and of 2.2 feet, 1965-70, in the Arvin-Maricopa area. We computerized the processing and plotting of compaction and water-level (stress-change) data, began reconnaissance subsidence investigations of the Sacramento Valley and the Oxnard-Ventura area, and completed an appraisal of potential subsidence under as-

Los Banos- Kettleman City area by the NOS, and prepare preliminary subsidence maps from the unadjusted data; and continue subsidence studies in the Sacramento Valley, the Oxnard-Ventura area, and the San Jacinto Valley.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 10.0019, LAND SUBSIDENCE STUDIES IN THE SAN JOAQUIN VALLEY - CALIFORNIA

J.F. POLAND, U.S. Dept. of the Interior, Geological Survey, Sacramento, California 95814

Objectives of this project are to study the extent, magnitude, rate, and causes of land subsidence in the San Joaquin Valley, Calif., to furnish criteria for estimating the amount of subsidence that would occur under assumed hydrologic change, to determine whether subsidence is reversible in part, and to suggest ways for stopping or ameliorating subsidence.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 10.0020, DENVER URBAN CORRIDOR STUDIES - COLORADO

W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

Project intends to derive maximum possible geotechnical information from existing available data, supplemented by areal, engineering geologic, hydrogeologic, geochemical, and geophysical studies. Geotechnical maps will be prepared at scales ranging from 1:125,000 to 1:24,000. Project covers virtually all the rapidly urbanizing area at the foot of the Front Range, and the rural areas between, from Fort Collins on the north to Colorado Springs on the south--a distance of about 120 miles, in a belt 40 miles wide extending from the foothills east across the Colorado piedmont. This is one of the fastest growing regions in the Nation. It contains a broad spectrum of geotechnical problems, such as swelling and subsiding foundation soils related to clayey and loessial substrates, declining artesian water pressures, shallow and rising water tables, increasing urban runoff, surface- and ground-water pollution, unstable slopes (landslides), declining gravel resources, urban sprawl across varied geologic terranes, solid waste disposal problems, and general environmental degradation. Project hopes to point up ways to help alleviate most of these problems through wise land-use planning and implementation.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 10.0021, ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA

R.W. LEMKE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Alaska.

Reconnaissance engineering geology studies, directed principally toward assessing potential earthquake and other geologic hazards, have been completed in the following Alaska coastal towns: Skagway, Haines, Sitka, Ketchikan, Metlakatla, Petersburg, Wrangell, Yakutat, Hoonah, Nome, Bethel, Dillingham, Naknek-King Salmon, Unalakleet, Kotzebue, and Barrow. It is concluded that most parts of these towns are built on more stable geologic materials than those beneath towns heavily damaged by the 1964 Alaska earthquake. Nevertheless, in the event of a large earthquake, some communities are susceptible to damage because of am-

reports on the southeastern Alaska region, mines, and Seward way have been released in open file, and reports are in various stages of preparation for the other communities. As of early 1973, this large project has been restructured, and report preparation responsibilities for Sitka, Metlakatla, Hoonah, Yakutat, Bethel, Naknek-King Salmon, and Unalakleet assigned to project 9550-00948.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 10.0022, DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE

T.A. MORGAN, U.S. Dept. of the Interior, Bureau of Mines, Denver, Colorado 80225

The objective is to evaluate the surface subsidence or surface collapse potential of multiple-level salt-dome mines and to develop engineering principles for the design of mines of this type that are safer and less prone to excessive subsidence. Subsidence is to be measured on the surface and all three mining levels. Shear strains measured on the upper levels will be related to the subsidence on those levels caused by mine closure on the lowest level.

SUPPORTED BY U.S. Dept. of Interior - Bureau of Mines

#### 10.0023, ESTABLISH TECHNIQUES FOR MONITORING SURFACE SUBSIDENCE OVER MINED AREAS

W.J. TESCH, U.S. Dept. of the Interior, Bureau of Mines, Denver, Colorado 80225

The project objective is to monitor ground subsidence over old mined areas, using equipment operable by non-technical people and to measure ground movement over and near operating mines. Movements over old coal mined areas, operating underground coal mines, and open-pit mines will be measured. The equipment used to make these measurements will include inexpensive monitoring equipment, inclinometer probes and automatic data acquisition systems, television probes, an acoustic geologic logging system and time-domain reflectometry measurements of break cables.

SUPPORTED BY U.S. Dept. of Interior - Bureau of Mines

#### 10.0024, MEASUREMENT AND EVALUATION OF SUBSIDENCE OVER A COAL MINE WITH VARYING OVERBURDEN THICKNESS

W.N. YOUNGS, U.S. Dept. of the Interior, Bureau of Mines, Denver, Colorado 80225

The work will include the measurement of the magnitude and rate of subsidence over several panels with different amounts of overburden and surface slopes. Measurements to be made will include vertical and horizontal movement as well as tilt.

SUPPORTED BY U.S. Dept. of Interior - Bureau of Mines

#### 10.0025, STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I

R.I. LEWELLEN, Arctic Inst. of North America, Washington, District of Columbia 20009

Abstract: The studies on the fluvial environment of the Arctic Coastal Plain, Province, Northern Alaska, include research which ranges in magnitude from small polygon troughs to the Inaru River Basin. The 208 figures include stereograms, ground and aerial photographs, graphs, curves, and maps. Ninety tables appear in the publication. The complete hydrographs for two tundra streams are included. Discussions in-

clude photographic and graphic entries provide references and a literature research. Chronologies of physical changes that occurred in the drainage basins are listed. Photographs and reproductions of computer printouts of data are presented in the Appendices.

Pub. 1972: 308p., NIS No. AD-749 150; PC 1000000

SUPPORTED BY U.S. Dept. of Defense - N

#### 10.0026, RETURNING UNDERGROUND COAL WASTES TO MINED-OUT VENTS

R.A. CARPENTER, Natl. Acad. of Sciences, District of Columbia 20037 (C310-269-000)

The National Academy of Sciences/National Research Council of Engineering will assemble a study committee to evaluate the state of knowledge and feasibility of underground disposal of solid wastes resulting from the deep mining of coal. Additional lines of investigation will be developed. Underground coal mining creates large, unsightly waste piles on the surface which occupy valuable space, pollute the water and dust to surrounding areas, some of which occasionally slump with disastrous consequences. Surface subsidence, due to collapse of underground voids, has resulted in destruction of property in many mining areas. The study findings, which will be based on European experiences, as well as analyses of similar projects in the United States, will permit informed judgments on allocation of research funds and legislation. The study group will have six representatives from the coal industry, State regulatory agencies, Federal agencies, and universities. Field examination will include waste piles and inspections made of R&D projects. Methods of replacing coal wastes in underground voids. Final report is scheduled for September, 1973.

SUPPORTED BY U.S. Natl. Science Foundation

#### 10.0027, EARLY DETECTION AND CONTROL OF SINKHOLE PROBLEMS - ALABAMA

J.G. NEWTON, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Map existing sinkholes and areas of active sinkhole development in Alabama. Investigate geologic and hydrologic conditions at sites of collapse or subsidence. Evaluate potential use of remote sensing as tools to locate potential sinkholes. Establish guidelines to detect potential sinkholes in highway corridors.

SUPPORTED BY U.S. Dept. of Transportation

#### 10.0028, SUBSIDENCE INVESTIGATIONS IN SOILS

B.G. VOLK, Agric. Res. & Educ. Center, Beltsville, Maryland 21705 (FLA-EV-01611)

Objective: Study chemical and physical characteristics of organic soils as related to rates of soil subsidence. Investigate the effects of soil amendments such as sand, clay, aluminum sulfate, and sterilizers and sludge materials as possible means to reduce subsidence. Investigate compounds found in the decomposition chain of organic soils in the Everglades and other areas.

Approach: Soil analysis - complete chemical and physical characteristics. Effects of environmental and climatic factors on subsidence. Carbon dioxide evolution and soil moisture columns will be determined and used as a basis for soil subsidence. Variables considered will include

temperature, time of incubation, soil pH, and water table height. Effects of soil treatments on subsidence. Amendments such as sand, clays, aluminum compounds, soil sterilizers, pesticides, and sludge materials will be added to histosols to check subsidence inhibition. Identification of compounds in organic soil decomposition. Chemical changes occurring as the organic matter decomposes will be followed by analysis of various fractions for functional groups and basic chemical structures.

**Progress.** The purpose of this investigation is to study the chemical and physical characteristics of histosols as related to rates of soil subsidence. Using chemical and spectroscopic methods, higher subsidence rates can be associated with the following changes in humic acid chemistry: (2) increases in CO(2)H, phenolic OH, quinone, and ketonic CO groups; (b) decreases in aliphatic structures as shown by IR spectra and alcoholic OH groups, and (c) decreases in molecular complexity as indicated by E(4)/E(6) ratios. The chemical reactions involved appear to be mainly oxidative, leading at first to the degradation of aliphatic structures and finally attacking the most stable aromatic structures with degradation to CO(2). CO(2) evolution determinations from soil columns by an automated continuous flow infrared gas analyzer show that increasing temperatures and water table depth are directly related to increased subsidence. Montverde muck, a Typic Medifibrist, lost 3.15 cm/yr as evolved C whereas Terra Ceia muck, a Typic Medisaprist, lost 1.61 cm/yr. Bulk density and % ash were inversely related to the C loss.

**SUPPORTED BY** Florida State Government - Tallahassee

#### 10.0029, REMOTE SENSING, ALAFIA AND PEACE RIVER BASINS, FLORIDA

**A.E. COKER**, U.S. Dept. of the Interior, Geological Survey, Tampa, Florida

(1) Fluorides and phosphates in central Florida move into the local environment by seepage from earthen lagoons designed to contain acid effluents produced from processing of phosphate ore. A marked need exists to rapidly detect and monitor areas subjected to these contaminants. (2) A decline of hydrostatic pressure has accelerated the natural process of sinkhole formation and homes and roads are subjected to sudden collapse. Subsurface geologic features such as relic sinkholes, and faults are related to areas of impending collapse. A marked need exists to refine the techniques for detecting areas of potential land collapse by remote sensing techniques.

(1) To synoptically and regionally detect areas subjected to high concentrations of fluorides and phosphates and develop techniques to rapidly monitor extensive land areas subjected to these contaminants. (2) To detect hydrogeologic conditions related to areas of impending land collapse and develop the techniques for delineating land areas which have a low probability for collapse and/or subsidence. In addition, these techniques may be used to delineate areas where artificial recharge, irrigation and drainage practices may be defined and effectively applied.

To apply remote sensing techniques to the detection and monitoring of fluoride and phosphate contamination and the delineation of hydrogeologic conditions and geologic structures related to impending land collapse. (1) Ground-truth test sites are established to test airborne remote sensing data for the specific experiments. (2) Remote sensing spectral data will be used to establish ground-truth test sites. (3) Three

Multispectral parameter mapping techniques to detect phosphate contaminated areas by remote sensing will be developed. Fluoride-phosphate contaminated areas will be detected by utilizing airborne ultraviolet scanner data which has been specially density processed.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 10.0030, VERIFICATION OF EMPIRICAL METHODS FOR DETERMINING RIVERBANK STABILITY (POTOMAC RIVER GEOMORPHIC INVESTIGATIONS - SOILS PHASE)

**C.C. CALHOUN**, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Purpose of study/investigation:** To determine causes of riverbank failures along the lower Mississippi river and to develop criteria for predicting soil conditions and susceptibility to liquefaction-type failures.

**Approach or plan:** Boring logs and gradation data for riverbanks planned for revetment in the Memphis, Vicksburg, and New Orleans Districts are analyzed and potential susceptibility to liquefaction is predicted. Field surveys of riverbanks are furnished by the three districts are evaluated to determine type of failure (either shear or liquefaction induced slide), and previous predictions based on empirical criteria are evaluated.

**Progress to date:** Annual reports were published on the project from 1954 to 1968. Starting with the 1968 data, reports are published biennially. The first biennial report, Potomacology II, Report 12-21, Verification of Empirical Methods for Determining Riverbank Stability, 1968 and 1969 Data, was published. The empirical criteria, modified in 1968, are used to classify fine sands into zone A and zone B, to predict gradation, and to predict potential susceptibility to liquefaction if the zone A sand thickness is 20 ft. or more, or the ratio of overburden thickness to zone A sand thickness is 0.85 or less. During 1968, the criteria were expanded to include the depth of thalweg for making predictions in the New Orleans District. Since 1954, a total of 10 flow failures have been recorded within 500 ft. of the boring locations, with 91 locations predicted to be stable and only 12 locations predicted to be unstable. Many locations predicted to be unstable have not experienced flow failure.

**SUPPORTED BY** U.S. Dept. of Defense - Army

#### 10.0031, MEASURE AND DEPICT TROUBLE SPOTS IN STEREO-MODELS - OHIO

**W.F. NORELL**, State Dept. of Transportation, Columbus, Ohio 43215

Stereo photo keys are being developed for use by stereoplotters in detecting and mapping foundation problem areas: landslides, landform changes due to mining, soft foundations, sinkhole topography, and deposits. Reports issued: 'Air Photo Patterns of Landslides in Southeastern Ohio', W.F. Norell, January 1966. 'Sinkhole and Overburden Mapping with Kelsch Photo', W.F. Norell, Highway Research Record No. 109. 'Air Photo Patterns of Subsurface Mining in Ohio', W.F. Norell, January 1968. 'Ohio Photogrammetric Research Solves Foundation and Right of Way Problems', Digest of the Interim Report of Research by Wayland F. Norell, Highway Research Record, Vol. 36, No. 9, August 1971.

**SUPPORTED BY** U.S. Dept. of Transportation - Federal Highway Administration



The objective of this proposal is to develop a technique which, when incorporated in groundwater management programs, will permit an optimum utilization of water resources, consonant with acceptable minimal subsidence. Specifically, the proposed technique will assist in the determination of the areal distribution of water wells, and in the selection of aquifer intervals to be exploited and the tolerable rates of depletion. The application of the technique will minimize and possibly halt subsidence where it is objectionable, thereby reducing damages being incurred by urban systems.

The proposed technique will be developed by correlating data obtained from several U.S. Geological Survey observation and test wells, located in the Houston-Galveston area, with laboratory consolidation characteristics of clay samples taken from the aquifer systems underlying the subsidence field under investigation. The laboratory equipment will simulate field conditions. The clay specimens will be subjected to the effect of slow fluid pressure decline. A computer program will be developed to facilitate the calculation of the anticipated amount and rate of land subsidence associated with a given rate of fluid pressure decline over a given area.

SUPPORTED BY U.S. Natl. Science Foundation

#### 10.0033, DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING

UNKNOWN, Unknown Inst. or Indiv. Grant, Wyoming

This report provides guidance to community planners and decision-makers facing subsidence problems over abandoned mines. It is based upon the findings, results, and conclusions of the demonstration project carried out by the City of Rock Springs, Wyoming in October 1970. The aims of the project were: Demonstrate the feasibility of backfilling underground mine voids for the prevention and alleviation of surface subsidence by a process developed by Dowell, a division of Dow Chemical Company. Assess the relative effectiveness of the process, its cost and benefits and its potential utility in other applications. Determine how the process might be applied in other cities like Rock Springs to deal with their subsidence problems. Determine whether the process advances the technology for subsidence prevention.

Pub. Nov. 73: 28p., NTIS No. P.B. 212708, PC \$3.00.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

## 11. SNOWSTORMS

### DISASTER MITIGATION

#### 11.0001, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines & Geology, Sacramento, California 95814

Abstract: This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of

problem, as well as costs and effectiveness of reduction measures, and agencies responsible for

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: P1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 11.0002, SNOW AND ICE DETECTION AND SYSTEMS

A.J. MCCONE, M B Associates, San Ramon, Calif. (045294)(TRAIS)

The objectives of this contract are to determine systems for snow and ice detectors, to select the best available for each requirement, and to evaluate a warning system for icy bridge conditions. Work includes a reference manual for use by maintenance and engineers in selecting, installing, operating and maintaining or multiple snow and ice detection and warning

Document provided to S.S.I.F. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation -

#### 11.0003, THE MODIFICATION OF GREAT LAKES WINTER STORMS

H.K. WEICKMANN, U.S. Dept. of Commerce, Phys. & Chem. Lab., Boulder, Colorado 80302

Abstract: In the Great Lakes region of the U.S.A., intensive winter storms form through a combination of continental air moving over large still-unfrozen warm water surfaces. These storms, depending on trajectories over the lakes and their persistence, precipitate large amounts of snow onto the shorelines of the Great Lakes. Natural freezing concentration causes heavily rimed crystals to form; increases their number, and prevents riming, which causes smaller crystal fall velocities. Consequently smaller velocities mean a longer transport of snow and away from the urban and industrial centers on the shores. The experiment is designed around a numerical model and a microphysical model of snow formation. The great variability of the cloud systems requires a clear definition of a homogeneous sample of experiments and, therefore, makes a clear statistical analysis possible. The execution involves seeding from the air, tracking the seeding agent through the cloud with an airborne freezing nucleus counter, and analyzing nuclei in the precipitated snowcrystals.

Pub. Jan. 73: 113p., NTIS No. COM. 73-50830/1: P1.45- NTIS.

SUPPORTED BY U.S. Dept. of Commerce - N.O.

#### 11.0004, NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmospheric Admin., Rockville, Maryland 20852

Abstract: The report discusses the National East Coast Winter Storms Operations Plan to develop a program to furnish weather observations for use in predicting and timely warnings of severe winter storms along the east coast of the United States. The plan considers the use of surface platforms, satellites. Arrangements, if practical, are made to meet requirements of research facilities

# 11.0005, SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN

R.W. HARMS, U.S. Dept. of Commerce, Natl. Weather Service, Kansas City, Missouri

Abstract: There are several types of winter storms which can produce very heavy snow in southeastern Wisconsin and the lower Great Lakes region. Two of these appear to be readily recognizable in their early stages of development. To facilitate discussion by forecasters these have been designated by the popular names, 'Panhandle Hook' and 'Alberta Clipper'. A third type, the 'Lower Mississippi' storm, is more erratic and considerably more difficult to forecast, as are the 'Westerly Storms' which travel south of Wisconsin and generally begin with snow but usually change to freezing rain and then rain or drizzle. This paper presents a model for each of these types of storms, and a snow depth forecasting scheme with modifications for types where appropriate.

Pub. Nov. 70: 22p., NTIS No. COM-71-00119: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 11.0006, A SYNOPTIC CLIMATOLOGY FOR SNOWSTORMS IN NORTHWESTERN NEVADA

B.L. NELSON, U.S. Dept. of Commerce, Natl. Weather Service, Salt Lake City, Utah

Abstract: The purpose of this study is to provide a climatological aid for forecasting snow in northwestern Nevada. A total of 112 snowstorms affecting Reno, Lovelock, or Winnemucca were analyzed to determine if these storms could be categorized into separate types. Five separate categories were defined and are discussed. Examples of four of these types are provided. A separate discussion of the unusual thunderstorm-snowstorm occurrence on May 20 - 21, 1971, is also provided.

Pub. Feb. 72: 30p., NTIS No. COM-72-10338: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 11.0007, PHYSICAL EVALUATION OF CLOUD SEEDING TECHNIQUES FOR MODIFYING OROGRAPHIC SNOWFALL - THE CASCADE PROJECT

P.V. HORBS, Univ. of Washington, School of Arts, Seattle, Washington 98105

In 1968, the University of Washington, under support from the Department of Interior and the State of Washington, initiated the 'Cascade Project' which was designed to develop a seeding technique for redistributing snowpack from winter storms from the west slope of the Cascade Mountains to the east slope in order to augment the Spring runoff into the Skagit River and Baker River which service the arid central region of the State of Washington. Criteria have been established for snowpack redistribution and in FY 1974, the University of Washington will establish the design for a possible pilot operation under joint State and Federal funding. This grant will provide support to the University of Washington to supplement the present statistical design with scientific observations, and mathematical model development which will assist in the understanding of the atmospheric mechanisms involved in snowpack redistribution, and permit the transfer of this technology to other geographical areas.

SUPPORTED BY U.S. Natl. Science Foundation

# 11.0008, DETERMINATION OF SNOW FENCE DESIGN

The purpose of this project is to perform all empirical and theoretical analyses necessary for a complete treatise on the control of blowing and drifting snow, based on the experience of the investigator, published literature, and studies of the Wyoming I-80 Snow Fence System. Specific items to be included are estimation of required capacity, optimum configuration, height, and placement of snow fences; tripping efficiency; procedures in engineering; and highway design for minimizing snow problems.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Wyoming State Government - Cheyenne

## HAZARD REDUCTION

# 11.0009, FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO

M.E. MILLER, U.S. Dept. of Commerce, Weather Bureau, Garden City, New York 11530

Abstract: Information presented in the study could be used to determine the probable stress which buildings, utility lines or other subjects would have to withstand from ice storms in Ohio. A mean recurrence table of annual number of days with freezing rain/drizzle for return periods of 2, 5, 10, 25, 50, and 100 years was devised for eight Ohio locations from output generated from a Poisson probability routine. Daily precipitation amounts associated with Ohio ice storms were less than .06 inch on 72.6 to 89.6% of the days with freezing rain/drizzle. Wind direction and speeds associated with periods of freezing rain/drizzle were also summarized.

Pub. Feb. 73: 11p., NTIS No. COM-73-10570: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## 12. TORNADOES

### INDIVIDUAL ASSISTANCE

# 12.0001, DISASTER INVESTIGATIONS

C.G. CULVER, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

Reasons for starting or progress last year: Post disaster investigations conducted last year include: (1) Flood damage following Hurricane Agnes, (2) Managua Earthquake investigation, (3) Collapse of Skyline Towers high-rise apartment building, and (4) Tornado damage in Fairfax County, April 1973.

The Hurricane Agnes investigation led to an NBS project for the Department of Housing and Urban Development in which NBS supplied technical assistance to HUD relative to the temporary housing (mobile homes) provided to the flood victims. A final report on the project was submitted to HUD on December 13, 1973. During the Managua Earthquake investigation, the CBT post disaster survey team provided direct assistance through the U.S. State Department to the Nicaraguan government in evaluating the safety of damaged buildings in Managua. A report of this work will be published in the Bulletin of the Seismological Society of America. In addition, CBT is working through the Department of Commerce in assisting with the development of building standards

had been violated during the construction of the building and if standards violation contributed to the collapse. A final report on this project was submitted to OSHA on June 11, 1973. In addition, an Interagency Agreement between NBS and the Department of Labor related to continuing NBS technical assistance relative to OSHA activities was formalized.

The investigation of tornado damage provided direct input to a project being conducted by CBT for the Defense Civil Preparedness Agency regarding the natural hazards evaluation of existing buildings. Typical failure modes produced by tornadoes were identified and significant building parameters to be evaluated in surveying the hazard potential of existing buildings were developed.

Approach: Investigations will be conducted following the occurrence of significant natural disasters including earthquakes, hurricanes and tornadoes. Surveys of other disasters, such as building collapses, fires, etc. will also be conducted as part of this program. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

#### 12.0002, TORNADO - THE VOICE OF THE PEOPLE IN DISASTER AND AFTER - A STUDY IN RESIDENTIAL INTEGRATION - TEXAS-(LUBBOCK?)

M.S. MINNIS, Texas Technological University, School of Arts, Lubbock, Texas 79409

Abstract: The basic focus of this research design is the study of the adjustment of the three ethnic groups, Anglo, Negro, and Mexican American--reflecting the tri-partite population composition of the city--to their new neighbors and their new residential setting. How do people learn to live together when they must--not directed by law or human value systems but by the freakish circumstance of nature, a destructive tornado.

Pub. Sep. 71: 197p., NTIS order No. PB-205 752: PC \$3.00 MF \$0.95.

SUPPORTED BY Texas Technological University - Lubbock

### PUBLIC ASSISTANCE

#### 12.0003, THE OCHELTREE TORNADO - A CASE STUDY - MISSOURI

W.E. FINLEY, U.S. Air Force, Environ. Tech. Appl. Center, Washington, District of Columbia

Abstract: A classic example of the midwestern United States tornado occurred near Richards-Gebaur AFB, Missouri, on 1 May 1972 (GMT date) as an associated feature of a steady-state severe thunderstorm. This case study of that storm describes synoptic and mesoscale aspects of the situation using meteorological charts and diagrams and presents radar scope photographs from the Air Force Air Weather Service AN/FPS-77 Storm Detection Radar at Richards-Gebaur AFB, near Kansas City, Missouri. Included in the photographs are several highly unusual range height indicator (RHI) sections through the parent thunderstorm and tornado tube. A partial survey of damage caused by the tornado is included. Some suggestions to non-centralized weather forecasters for coping with an imminent tornadic thunderstorm are presented in the final section of the Technical Note.

Pub. Mar 73: 35p., NTIS order No. AD-768 391/5: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Air Force

Abstract: The Building Research Division of Standards Institute of America sent a three-man team to investigate the damage to other structures caused by the tornado at Lubbock, Texas, on May 11, 1970. The authors of this report--carried out part of the ground and from a helicopter on May 11 and 16, 1970. The report is based on data collected during this period but includes some data from other agencies and individuals whose assistance was requested in the report. The report concludes that the damage in the design and construction of buildings would have greatly reduced the damage to the Lubbock. It also notes that natural disaster tests of buildings and urges the development of criteria with respect to wind loads and building standards.

Pub. Mar 71: 44p., NTIS order No. PB-205 752: PC \$0.95-NTIS.

SUPPORTED BY U.S. Dept. of Commerce

#### 12.0005, FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - TEXAS - 1974

UNKNOWN, U.S. Dept. of Commerce, Federal Meteorological Service, Washington, District of Columbia

Abstract: The federal plan is the ninth in a series developed by the federal coordination committee for meteorological services and supporting research in response to Public Law 87-843. This plan focuses on the development of meteorological services that will contribute to the safety and welfare and to the effectiveness of the federal government. The highest priority is being given to the development of a system needed to observe, predict, and protect against storms, such as hurricanes and tornadoes.

Pub. Jun. 73: 62p., NTIS order No. PB-205 752: PC \$1.45.

SUPPORTED BY U.S. Dept. of Commerce

#### 12.0006, XENIA REBUILDS

UNKNOWN, Xenia Commission, Xenia, Ohio

This report contains strategies for rebuilding a community after a disaster. It is concerned with the reconstruction, objectives and policies for the rebuilding of the existing situation, design concepts for the rebuilding of the residential situation, land use recommendations, and implementation mechanisms. It also discusses the manner in which an economically sound rebuilding program in a form which is both acceptable and effective for the residents.

SUPPORTED BY U.S. Dept. of Housing and Urban Development

#### 12.0007, MORPHOLOGY OF TWO TORNADOES - AN ANALYSIS OF NSSI DATA - OKLAHOMA CITY, OKLAHOMA

S.L. BARNES, U.S. Dept. of Commerce, National Severe Storms Institute, Norman, Oklahoma

Abstract: On the night of April 29-30, 1973, two tornadoes passed over the NSSI-operated radar network in central Oklahoma. Morphological data from graphic recordings, upper air soundings, and digital radar data were analyzed as part of a series concerning various

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0008, TORNADO INCIDENCE MAPS***A. COURT, U.S. Dept. of Commerce, Natl. Severe Storms Lab., Norman, Oklahoma*

**Abstract:** Tornado occurrences in the United States have been tabulated and shown on maps since 1884, but very few of the 109 such maps, reproduced and discussed here, show actual tornado incidence per year per unit area; most are totals for periods of 6 to 62 years, by states, or by latitude-longitude quadrangles of varying areas. In the past century, the apparent center of maximum tornado incidence has moved southwestward, from western Illinois to Iowa and Missouri, to Kansas, and now to Central Oklahoma, where the annual incidence per 10,000 square miles is 3 to 21 tornadoes, depending on the period for which reports are used. Proliferation of official tabulations, by states and quadrangles and for varying periods, has obfuscated the pattern of tornado occurrence, and failure to tabulate and map the actual damage areas has precluded a clear depiction of actual tornado hazard. To eliminate confusion, tabulations and damage area maps by 5-year and 10-year periods beginning in 1956 are recommended.

Pub. Aug 70: 84p., NTIS Order No. COM-71-00019: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0009, TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880-1970)***J.P. VAIKSNORAS, U.S. Dept. of Commerce, Natl. Weather Service, Nashville, Tennessee*

**Abstract:** The growing need for tornado information on time and areal distribution prompted this study. A description of most destructive past tornadoes in Tennessee is given. Charts and tables of statistics of tornado occurrence, days, death, injuries and damage are presented. A remarkable improvement in the tornado fatality rate in recent years is noted.

Pub. Dec. 71: 37, NTIS No. COM-72-10349: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0010, ARIZONA 'EDDY' TORNADOES***R.S. INGRAM, U.S. Dept. of Commerce, Natl. Weather Service, Salt Lake City, Utah*

**Abstract:** Not all tornadoes and funnel clouds reported in Arizona are true tornadoes. Perhaps as many as 75 percent of them are 'eddy tornadoes', dust devils, hail shafts, or areas of heavy rain. The apparent increase from 1963 to 1973 is not believed to be related to changing meteorological conditions, but to other factors such as: increase in population; increase in public awareness due to disaster publicity; overreaction due to the 1971 tornado in Tempe; and the fact that not all localized circular storms are true tornadoes.

Pub. Oct. 73: 13p., NTIS No. COM-74-10465/4: PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**DISASTER MITIGATION****12.0011, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC**

**Abstract:** This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: PC \$7.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Housing &amp; Urban Development

**12.0012, NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN***R.E. HALLGREN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235*

**Abstract:** This is the sixth of an annual series of National Severe Local Storms Operations Plans. It outlines the responsibilities of the various United States agencies which provide meteorological services in observing and forecasting severe local storms. One chapter provides definitions and other chapters deal with details on forecasts and warnings, communications, observation and publicity. Includes maps showing county warning areas by regions; lists of radar sites and weather stations; and a table showing non-network upper air stations which might be sources of data.

Pub. Jan. 73: 57p., NTIS No. COM-73-10510: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0013, NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN***UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235*

In a memorandum dated October 23, 1969, the Chairman, Interdepartmental Committee for Meteorological Services (ICMS), established an Ad Hoc Group to function under the purview of the Subcommittee on Basic Meteorological Services (SC/BMS). The task of the Group was to develop an Operations Plan designed to furnish weather observations for use in predicting and providing adequate and timely warnings of severe and crippling winter storms along the east coast of the United States. This Plan was to consider use of surface platforms, aircraft, and satellites. Arrangements, if practical, were to be made to meet the data requirements of research facilities.

The National East Coast Winter Storms Operations Plan was developed to meet this request.

The following revised Plan has been developed to reflect the current systems and procedures.

Pub. Oct. 73: 103p., FCM 73-7, U.S. Dept. of Comm., NOAA.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0014, NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN - 1974***UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235*

12.0015,

sibilities of the various United States agencies which provide meteorological services in observing and forecasting severe local storms.

Interdepartmental Severe Local Storm Conferences, of which there have been four, bring together cognizant Federal agencies to resolve problems of mutual concern related to the National Severe Local Storms Warning Service. Such conferences are now held biennially. National Weather Service Severe Local Storm Conferences are held annually.

This plan supersedes the 1972 interdepartmental version and reflects the recommendations of the 1973 National Weather Service Severe Local Storms Conference and the SC/BMS Working Group on Severe Local Storms.

Pub. Feb. 74: 53p., FCM 74-3, U.S. Dept. of Comm., NOAA.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 12.0015, MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971 - A REPORT TO THE ADMINISTRATOR

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

The morning after the disastrous tornadoes swept through northwest Louisiana, northwest Mississippi, and southwest Tennessee, a survey team was dispatched by the National Oceanic and Atmospheric Administration to the devastated areas to review the effectiveness of NOAA's tornado warning services. This report--Mississippi Delta Tornadoes of February 21, 1971--presents the findings and recommendations of the survey team.

Pub. Jul. 71: 57p., Natural Disaster Survey Report 71-2, U.S. Dept. of Comm., NOAA.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 12.0016, WATER WARNINGS AND SPECIALIZED FORECASTS

UNKNOWN, U.S. Air Force, Air Weather Service, Belleville, Illinois 62225

Abstract: The manual states policy, outlines responsibilities, and prescribes procedures for providing weather warnings and specialized forecast support to authorized recipients. AWS/DO is OPR for Volume I, which applies to all AWS units. AWS Forms 39 and 39a are prescribed in this volume.

Pub. Oct. 71: 28p., NTIS No. AD-732 263: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 12.0017, DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS

S.A. CHANGNON, State Water Survey, Urbana, Illinois 61801

A long-term project in which two dense rain gage networks encompassing 800 and 2200 square miles are presently operated to provide basic data for various climatological, hydrometeorological, and severe storm studies. Data also provide useful information for evaluating the potential of weather modification and designing precipitation modification experiments. One network is located in the St. Louis area to study urban-industrial effects on rainfall and the other in the central Illinois flatlands to sample different climatic and rural conditions.

SUPPORTED BY Illinois State Government - Springfield

Abstract: The aspects of wind-induced building motion resulting human response are investigated. A criterion and rational approach for considering this in building design are proposed. The physical character of wind-induced building acceleration motion is described. Methods for estimating acceleration are considered. A simplified analytical approach in equation and design code is presented. The general problem of human response to building motion is discussed and the results of response surveys conducted in two tall buildings after wind storms are reported.

Pub. Nov. 71: 261p., NTIS No. PB-205 262: PC \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

#### 12.0019, NUMERICAL ANALYSIS OF TORNADO LOADS ON BUILDINGS - TEXAS

R.A. GENTRY, U.S. Atomic Energy Commission, Los Alamos Scientific Lab., Los Alamos, New Mexico 45202

A detailed numerical study of the various flow variables meteorological data will be conducted on the May 1969 Lubbock tornado. The following tasks will be performed: 1) A reconstruction of local wind conditions in the vicinity of each major structure studied; 2) Graph representation of computed wind and pressure fields in the vicinity of buildings studied; 3) Pressure contour plots depicting calculated wind pressures on major building surfaces. This analysis of the relationship between the computed wind pressures and the estimated loads from structural damage studies.

SUPPORTED BY U.S. Natl. Science Foundation

#### 12.0020, SUMMARY OF 1969 AND 1970 PUBLIC THUNDERSTORM AND TORNADO WATCHES ISSUED BY THE NATIONAL WEATHER SERVICE, EASTERN REGION

M.E. MILLER, U.S. Dept. of Commerce, Weather Bureau, Garden City, New York 11530

Abstract: The purpose of this report is to summarize, by responsibility, the severe local storm watches issued by the Eastern Region, during 1969 and 1970. Only those watches which affected the assigned area of responsibility are included in making each station's tabulation. Watches outside the assigned area, but within 100 miles, were not included in station tabulations. For this two year period, eight Eastern Region stations with the greatest number of watches within their assigned areas of responsibility were identified. Ohio. In 1970 there were nearly twice as many public thunderstorm and/or tornado watches within the Northern Region as compared to 1969. Nearly 45% of local storm watches during 1969 and 1970 had times of 1300 to 1600 EST.

Pub. Oct. 73: 32p., NTIS No. COM-74-10160/1: PC \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 12.0021, TORNADOES

E. KESSLER, U.S. Dept. of Commerce, Natl. Severe Storm Lab., Norman, Oklahoma

Abstract: The prominent characteristics of tornadoes from a sociological and meteorological importance, aspects of the National Weather Service that pertain to storm forecasting and warning, and observational and theoretical studies of tornadoes.

Case histories of two severe thunderstorm situations in Oklahoma illustrate how the WSR-57 contour display aids identification of severe local storms. The path leading from analysis of the radar display and other data to dissemination of severe storm advisories is examined. Results indicate present and potential roles of various information sources in the weather warning system.

Pub. Apr. 73: 19p., NOAA Tech. Memo ERL NSSL-63, NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## HAZARD REDUCTION

### 12.0023, SEVERE STORM MORPHOLOGY - OKLAHOMA

S.L. BARNES, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302

Research/service objective: Determine the meteorological conditions in and around severe thunderstorms as an aid in developing morphological and dynamical concepts regarding their internal nature and their dependency on and interaction with the ambient atmosphere.

Research/service plan: Completion of ongoing case studies which combine surface and upper air measurements with conventional and single Doppler radar information should reveal additional structural details of severe thunderstorms not heretofore observed. Detailed observation of tornado cyclones is expected to cast new light on the conditions required for their formation and how, once established, they interact in environmental flow. Single Doppler data obtained in a tornado-producing storm (Union City, Oklahoma, May 24, 1973) will be correlated with surface wind and pressure measurements from a dense network of stations and a small sample of upper air soundings to provide a comprehensive description of such storms. This portion of the project's work will be closely coordinated with other NSSL projects studying individual aspects of this storm. Also in concert with other laboratory projects, plans for an expanded observational program centered about dual Doppler data acquisition will be developed for the Spring of 1974. Several new technological developments will be addressed including objective analysis of Doppler velocity measurements in three-dimensional space and computer abstracting of surface strip records.

Progress report: A technique for analyzing the distribution of meteorological variables by computer was applied to routinely-available weather reports from Oklahoma and adjacent states to provide operational guidance information for predicting severe storm outbreaks. A variety of computer/plotter techniques were developed to more rapidly and accurately display important meteorological parameters such as streamlines and isotachs. A preliminary report on the structure of two tornadic storms was presented at the 15th Radar Meteorology Conference. The evolution of a storm that produced twin tornadoes revealed the important role of the thunderstorm gust front in the tornado genesis mechanism.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 12.0024, PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-30, 1970

S.L. BARNES, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302

30, 1970. Calculations based on three-hourly rawinsonde reveal that strong surface moisture convergence characterized the development region throughout the Severe Storms Laboratory rawinsondes, taken over a 24-hour period when storm intensities increased, causing low-level moisture, intruding dry air at mid-levels, increasing winds aloft. Magnitudes of Lifted Index, height of wet-bulb zero and hail size close to the defining studies' results for severe thunderstorms in these four thermodynamically-based parameters commonly used to estimate storm intensity, particularly changes in storm severity.

Pub. May 74: 233p., NOAA Tech. Memo. ERL NSSL-63, NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 12.0025, LIFE CYCLE OF FLORIDA KEY WATERSPOUTS

J.H. GOLDEN, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302

Analyses show that waterspouts have a characteristic life cycle consisting of five overlapping stages: (1) the initial stage, identified by a prominent light-colored disc or cloud base, surrounded by a dark patch diffuse on the surface that is a manifestation of a complete vortex; (2) the spiral stage, characterized by development of alternating dark and light surface bands spiralling around the dark spot; (3) the ring (incipient spray vortex), concentrated around a dark spot, with a lengthening funnel above; (4) the mature stage (spray vortex), determined as the stage of maximum overall organization and intensity; and (5) the dissipating stage, characterized by waterspout dissipation (often abrupt) forced by cool downdrafts from a nearby rainshower.

Frequent waterspout formation in the Florida Keys is a life cycle apparently result from transfer of angular momentum among five scales of atmospheric motion: (1) the funnel scale, corresponding to the waterspout with funnel diameters from 10 to 500 ft; (2) the meso-scale, from 500 to 3,000 ft at the surface; (3) the incipient cyclone scale, from less than 1 to 5 mi; (4) the cloudline scale, from 5 to 100 mi; and (5) the synoptic scale, several hundred miles. The differing roles of these scales of motion are assessed.

Pub. Jun. 74: 147p., NOAA Tech. Memo. ERL NSSL-63, NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 12.0026, DOPPLER RADAR METHODOLOGY FOR OBSERVATION OF CONVECTIVE STORMS

R.M. LHERMITTE, U.S. Dept. of Commerce, Nat. Atmos. Admin., Boulder, Colorado 80302

Abstract: The authors outline the concept involved in the design parameters required for optimizing the use of the dual-Doppler method. The accuracy of two-dimensional velocity estimates, as controlled by radar signal processing and data processing, and the method required to achieve this accuracy are also discussed.

Pub. 1972: 7p., NTIS No. COM-73-10119-40.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0027, EM RADIATION-TORNADOES**

*JV TAYLOR*, U.S. Dept of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C371242)

Research/service objective: Study EM radiation from the lightning associated with severe storms to determine electrical characteristics that indicate the spawning or existence of tornadoes

Research/service plan: Analyze previously collected data to determine EM characteristics of tornadoes and continue to record and analyze data from the 15 tornado detectors operating in 'Tornado Alley' through September '73, improve detectors by adding direction finding capability, and continue operational tests in calendar 1974.

Progress report: Burst rates obtained from observations at frequencies above 1 MHz are most indicative of tornado and severe storm activity. Very good preliminary correlations between burst rates from the 3 MHz detectors and severe storm reports have been obtained.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0028, HURRICANE SPAWNED TORNADOES**

*D.J. NOVLAN*, Colorado State University, School of Engineering, Fort Collins, Colorado 80521

Abstract: An updated climatology of hurricane tornadoes is presented from information gathered for U.S. cases from 1948-72 and typhoon induced tornadoes over Japan from 1950-71. The paper presents a qualitative tornado genesis model which attempts to demonstrate the crucial importance of large low level vertical wind shear in the genesis mechanism. A forecasting guide is also given. The most important difference between storms which produce tornadoes and those which do not is a very large increase of the vertical shear of the horizontal wind between the surface and 4-5 thousand feet. This averages about 40 knots for the tornado cases, but is much less in the cases which do not produce tornadoes

Pub. May 73: 64p., NTIS No. COM-73-11296/3. PC \$5.00 MF \$1.45

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0029, FORECASTING GUSTY SURFACE WINDS IN THE CONTINENTAL UNITED STATES**

*A.W. WATERS*, U.S. Air Force, Air Weather Service, Belleville, Illinois 62225

Abstract: The technical report contains case studies of strong surface wind gust occurrences which occur under specific conditions in certain designated areas called 'Wind Boxes.' There are ten such wind boxes within the contiguous United States. Actual cases are included with several of the main weather charts used in forecasting gust occurrences. Procedures shown herein are a relevant part of the method used by the Military Weather Warning Center in forecasting gusty surface winds.

Pub. Jan 70: 76p., NTIS No. AD-706 392. HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Defense - Air Force

**12.0030, ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON**

*T.T. FUJITA*, Univ. of Chicago, School of Physical Sciences, Chicago, Illinois 60637

Each storm was reevaluated using the author's 'tornado characterization' based upon the intensity of each storm. Combined analyses of the digitized characterized tornadoes and hailstorms revealed the existence of tornado alleys and hail swaths in the area. It was concluded that the maximum speed of tornadoes ranges between 200 and 225 mph and minimum wind speed of 175 mph seems to be a good figure for tornadoes elsewhere. Expected maximum pressure drop of 1.5 psi and time change of 1 sec in pressure of 200- mph tornadoes were also

Pub. Dec 70: 34p., NTIS No. COM-71-00731. PC \$0.95

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0031, PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY**

*T.T. FUJITA*, Univ. of Chicago, School of Physical Sciences, Chicago, Illinois 60637

Abstract: The research paper provides data to support the proposed characterization of tornadoes and hurricanes by area and intensity. A test characterization of U.S. tornadoes in 1950-69 was accomplished for comparison with 893 U.S.A. tornadoes in 1965. The percentage distribution of intensity and individual area of U.S. and Japanese tornadoes is very similar except for large and/or intense cases. It was found that the F-scale variation along the paths of U.S. tornadoes showed an intensity oscillation with a 45% variation. Characterization of hurricanes and typhoons showed that average typhoons are more intense than average hurricanes.

Pub. Feb 71: 53p., NTIS No. COM-72-10828. PC \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

**12.0032, STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS, ILLINOIS**

*S.A. CHANGNON*, State Water Survey, Urbana, Illinois 61801

Abstract: The activities and results reported upon in this report represent those resulting from the second year of a project. The general goal of the Water Survey project involving METROMEX (Metropolitan Meteorological Experiment) consists of the delineation of any anomalous precipitation and severe weather patterns and from St. Louis and environs, the quantification of the frequency of any such anomalies, investigations of the relevance of findings to the local area and to other urban areas of Illinois, and the transmission of these findings to potential users in the scientific community and to the general public of Illinois. New activities largely concerned (1) a decrease in instruments to define better precipitation patterns; (2) instrumentation was added to better define temperature and humidity patterns of the surface; (3) field observations and analysis pertaining to the airflow and urban circulation; (4) the external application for transmission of findings to users.

Pub. Apr 73: 54p., NTIS No. PB-230 325/3. PC \$1.45.

SUPPORTED BY U.S. Natl. Science Foundation

**12.0033, HYDROMETEOROLOGICAL ANALYSIS**

## MAJOR DISASTER TYPES

analyses are based on radar, synoptic weather, and field survey data, and include area-depth-duration relations, antecedent rainfall evaluation, isohetal maps for peak periods of storm.

SUPPORTED BY Illinois State Government - Springfield

### 12.0034, STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA

G. MORGAN, State Water Survey, Urbana, Illinois 61801

A project to develop a data bank and climatology of the conventional synoptic entities (surface fronts, squall lines, and pressure centers) over North America. The procedure employed consists of determining the daily frequencies of occurrence of the various synoptic features in 60x60-mile squares. When stored in digital form this information can be used in a variety of ways including study of 1) the distribution of frequencies of occurrence of the synoptic features by months or seasons; and 2) the distribution of frequencies of occurrence associated with particular severe weather phenomena, such as heavy rains and tornadoes in Illinois, to help explain their distribution. The frequencies, separated by months, and combined with other climatological data, can be used in multiple regression schemes to model the climatology of such severe weather hazards as thunderstorms, tornadoes, damaging winds, and hailstorms.

SUPPORTED BY Illinois State Government - Springfield

### 12.0035, PROBABILISTIC MODELING OF EXTREME LOADS

Y.K. WEN, Univ. of Illinois, School of Engineering, Urbana, Illinois 61801

This project deals with probabilistic modeling and risk analysis of extreme environmental loads caused by tornadoes, hurricanes and earthquakes. The physical aspects of the natural phenomena which cause these loads are incorporated into the formulation and the occurrences of these loads are modeled by random processes. The results are presented in a form suitable for practical applications.

SUPPORTED BY University of Illinois

### 12.0036, DUST DEVIL METEOROLOGY

J.R. COOLEY, U.S. Dept. of Commerce, Natl. Weather Service, Kansas City, Missouri

Abstract: A complete analysis and understanding of the dust devil would provide new insight into the process within - and our ability to predict the behavior of - other larger, more destructive, and relatively elusive atmospheric circulations. This memorandum contains the history, morphology, and theoretical modeling of the dust devil. There is a tremendous change in the meteorological parameters across a horizontal and vertical cross-section of the dust devil; it represents a very sizeable amount of atmospheric energy when it releases the highly unstable superheated air from the boundary layer. Consequently, it may play a significant role in the heat transfer processes that take place in the atmosphere, particularly in the desert regions during months of large solar angles.

Pub. May 71: 39p., NTIS No. COM-71-00628: PC \$ 3.00 MF \$ 0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

Abstract: The log of all reports of severe storm 1956 through 1966 was used to determine a data base for the area of the contiguous 48 States.

Pub. Sep. 71: 2p., NTIS No. COM-72-50079-03-09

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 12.0038, BEHAVIOR OF WINDS IN THE LOW LEVELS OF THE ATMOSPHERE - 1000 FEET IN CENTRAL OKLAHOMA - JUNE 1967

K.C. CRAWFORD, U.S. Dept. of Commerce, National Weather Service Storms Lab., Norman, Oklahoma

A television tower in northern Oklahoma City, Oklahoma, equipped with wind and temperature sensors at 6 levels ranging from 146 ft to 1458 ft above the base of the tower. Wind speed and direction data are also obtained from a nearby tower 23 ft above the base level and 40 ft above the base of the television tower. This report presents a year data sample consisting of the mean wind speed, direction, and the highest recorded gust during each 1-hour period per hour was used in this study.

The annual arithmetic mean wind speed increases with height at the surface to 18.7 kt at the top level. The mean wind speeds below the level at 296 ft are lowest at night and highest during the day, and the speeds above 296 ft are lowest during the day and highest at night. Most of the change occurs in short time periods shortly after sunrise and near sunset.

Annual relative frequency distributions of wind speed are bimodal with most of the winds being either northerly or southerly. The primary peak occurs in the 10 degrees to 20 degrees centered on 180 degrees at the lowest 3 levels and 180 degrees at the upper 4 levels. The direction veers between the surface and top levels 80% of the time. At the higher wind speed, the more likely the direction is southerly.

The direction of the annual resultant (vector mean) wind is 181 degrees at the lowest 4 levels and veers with height to 198 degrees at level 6. The resultant directions are constant with height between 1700-1000 CST and 1000-0500 CST with height during midday. Winds at all levels veer between 2100 and approximately 1100 CST and with time during the remaining hours.

The variability of wind speed and direction is investigated using transition matrices (probabilities for change with time) and wind persistence (number of consecutive observations in which winds blow from a given sector).

Wind shear speed is greatest in the lowest layer and decreases with height. Speed shear is dominant over direction shear in the lower 3 layers and a combination of speed and direction shear occurs in the upper 3 layers. The speed shear is most rapid near sunrise, reaches a minimum in early afternoon, and increases rapidly near sunset. Shear is greatest in the lower layers at night than during the day.

Pub. Aug. 70: 57p., ESSA Tech. Memo. ERL TM-70-10, NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - E.S.S.A.

### 12.0039, SOME STATISTICAL ASPECTS OF TORNADO SPOUT FORMATION - FLORIDA

J.H. GOLDEN, U.S. Dept. of Commerce, Natl. Weather Service, Miami, Florida



Lower Keys are primarily a rainy-season phenomenon. The diurnal distribution of water spout funnels (1958-1968) is shown graphically. The longest-lived funnel during the 1968 season lasted 52 min. A preliminary study was conducted using waterspout/funnel statistics with the Local Climatological Data for Key West, May through September, years 1964-1968.

Pub. 1973: 13p., NTIS Order No. COM - 74- 10334/2: Reprint.  
SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 12.0040, IMPACT OF THE LUBBOCK STORM ON REGIONAL SYSTEMS - TEXAS

J.E. MINOR, Texas Technological University, School of Engineering, Lubbock, Texas 79409

Abstract: Four major factors contributed to a study of the impact of disaster on regional systems: the relative isolation of the Lubbock economic region, the location of the city of Lubbock at the center of a vast commodity distribution network, the depth and diversification of the Lubbock economy, and the severity of the storm which struck the city on May 11, 1970. Conclusions developed from the investigation will be of interest to local civil defense directors and to civil defense operations personnel.

Pub. Jun. 72: 80p., NTIS No. AD-753 202: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 12.0041, COMPUTER SIMULATION OF SEVERE STORM OBSERVATIONS WITH DOPPLER RADARS

UNKNOWN, Tetra Tech Incorporated, Arlington, Virginia 22209

Abstract: A computer program developed for simulating the performance of severe storm observations with Doppler radars is described. The computer program consists of the main calling program, STORMS, six subroutines entitled POINT, SAMPLE, MONO, INVERT, GRID and INTGL, and one function subprogram, PHI. The liberal use of comment cards in the program source deck provides detailed documentation of interest to the programmer. The purpose of this report is to describe briefly, for the potential user, the capabilities of the program, the functions of the main program, subroutines and subprogram, and to document some results which have already been obtained by exercising the program.

Pub. Aug. 70: 30 p., NTIS No. COM-71-00020: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 13. TSUNAMIS

#### DISASTER MITIGATION

#### 13.0001, FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA

C. PETRAUSKAS, Univ. of California, School of Engineering, Berkeley, California 94720

Abstract: Of particular concern to the U.S. Army Corps of Engineers is the protection of Crescent City, California from fu-

tively, and the tsunamis caused millions of dollars of damage. Presently studies are being conducted by the Corps to determine the required height of a seawall fronting the ocean. This report presents a method for taking into account the occurrence of tsunamis with respect to the astronomical tide. The important parameter describing the tsunami's potential is assumed to be the maximum total water level during the occurrence of a tsunami. The total water level is assumed to be the sum of the tide water level and tsunami water level with respect to the tide. The method is applied to the 1960 and 1964 tsunamis that were recorded at the Crescent City tide gage at Dutton's Dock. The resulting histogram of the maximum total water level for each tsunami which can then be used to evaluate the severity of the tsunamis.

Pub. Mar. 71: 69p., NTIS No. AD-724 119: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 13.0002, GENERAL REVIEW OF THE SEISMIC HAZARDS TO SELECTED U.S. NAVY INSTALLATIONS

J.B. SEED, Calif. Inst. of Technology, Graduate School of Engineering, Pasadena, California 91109

Abstract: The report summarizes the findings of the Hazards Review Panel whose mission it was to investigate the nature and magnitude of the threats posed to Naval bases by earthquakes and earthquake-related natural hazards including tsunamis, seiches (and the accompanying flooding), landslides, mudflows and soil foundation failures which result from earthquakes. In addition to citing the problems for Naval bases in the San Francisco, San Diego and the Manila areas, the introduction to this report recommends conducting a rapid visual survey initially to determine the nature of various danger areas. It then recommends a follow-on procedure leading to various strategic engineering decisions which will provide the required degree of protection to insure Fleet Operational Readiness and provide cost effectiveness in protecting the Navy against earthquake damage.

Pub. Jan. 74: 45p., NTIS No. AD-778 005/9: PC \$3.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 13.0003, URBAN GEOLOGY PLAN FOR CALIFORNIA: THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines & Geology, Sacramento, California 95814

Abstract: This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, landslides, mineral resources to urbanization, landsliding, flooding, volcanic activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible reduction measures, and agencies responsible for those measures.

Pub. Jun 73: 111p., NTIS No. PB-222 447/5: PC \$7.00 MF \$1.45.

**Technical objective:** Through analysis of earthquake fault mechanisms, establish the causative mechanism of tsunami generation. Once done, the incorporation of such understanding into the tsunami warning network will greatly strengthen the warning capability of this network program.

**Approach:** Refine the statistical and physical models by which earthquake fault mechanisms are analytically determined such that meaningful correlation with the generation of tsunamis can be observed.

**Progress:** Both the statistical and physical models for solution of earthquake fault mechanisms have been greatly improved; this is being documented in several journal articles.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 13.0005, TSUNAMI RESEARCH

**G.R. MILLER**, U.S. Dept. of Commerce, Environ. Research Laboratories, Boulder, Colorado 80302 (2C650128)

**Research/service objective:** To improve our understanding of the generation, propagation, and run-up mechanisms of tsunamis from the view point of basic knowledge and to improve the operation of the Tsunami Warning System.

**Research/service plan:** Continue development of tsunami gauges in addition to analytic and numeric development of tsunami propagation. Installation of gauges under ocean station 'Papa'; installation of magneto-telluric sight in Bermuda in connection with Project MODE.

**Progress report:** Installation of a magneto-telluric sight at Ewa Beach. Deep ocean wave records obtained in vicinity of Amchitka Island. Numerical work completed on harbor resonance, wave shoreline interaction and on harbor and shelf resonance.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 13.0006, TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V

**UNKNOWN**, U.S. Dept. of the Interior, Washington, District of Columbia

**Abstract:** Presented are data pertinent to the construction of a marine terminal at Valdez, Alaska for the Trans Alaska Pipeline. The contents include: Feasibility study for the construction of dock facilities; Study concerning effects of the 1964 Tsunami at the site; Environmental study baseline survey for Port Valdez; Measurement of water current direction and velocity at the site (Jackson Point) Port Valdez; Aseismic Design Study; Model studies report; Floating dock, Valdez, Alaska; Collection of temperature and wind data for the site from 1968 to present.

**Pub. Feb. 71:** 595p., NTIS No. PB-201 356 PC \$6.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Interior - O.W.R.T.

### 13.0007, WAVE REPORTING PROCEDURES FOR TIDE OBSERVERS IN THE TSUNAMI WARNING SYSTEM

**M.G. SPAETH**, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

**Abstract:** The Tsunami Warning System provides tsunami warning information to the civilian population and military personnel of the Pacific region. Although a cooperative effort of international scope, the responsibility for developing, administering, and operating the Warning System is assumed by the Coast and Geodetic Survey, Environmental Science Services Administration, whose Honolulu Observatory serves as

publication is to provide general information and specific instructions to aid observers in reporting tsunamis.

**Pub. Jun 70:** 48p., NTIS No. COM-71-00170: PC SOD MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 13.0008, TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION

**UNKNOWN**, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

**Abstract:** The time required for a tsunami to reach a given station from an earthquake whose epicenter is within the area covered by the time curves can be obtained by plotting the location of the epicenter on the chart and noting its position with respect to the time curves.

**Pub. Jun. 71:** 53p., NTIS No. COM-71-00918: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

### 13.0009, STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION

**A.M. KAMEL**, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** Six series of tests were conducted on 1:50-scale models of rubble-mound barrier truck sections to obtain design criteria for rehabilitation of the existing barrier and construction of a new one at Hilo Harbor, Hawaii. The model test sections were subjected to the attack of tsunamis and short-period waves. Proposed designs involved overtopping and nonovertopping barrier sections with protective cover layers of quarystones and tribars.

**Pub. Aug. 67:** 135p., NTIS No. AD-721 961: MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

### 13.0010, STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION

**N.R. OSWALT**, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** Steady-flow tests of navigation opening structures in the Hilo Harbor tsunami barrier were conducted to determine the effect of tsunami-induced high-velocity currents through the navigation opening on stability of the barrier heads. Tests were conducted in a 1:60-scale model which reproduced one-half of the navigation opening and a 1:72-scale model which reproduced the full opening. Steady flow through the opening with a head differential of 28 ft across the barrier was the basic test flow, representing the peak flow condition caused by the design tsunami. Tests were designed to determine the cover-stone size required on the barrier heads for stability under this steady-flow condition and also to investigate methods for providing toe protection for barrier heads constructed on sand. Results of the steady-flow tests were to be correlated with results of model tests concerned with wave action and with factors to develop the optimum design of the tsunami barrier.

**Pub. Oct. 66:** 53p., NTIS No. AD-720 981: PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

### 13.0011, TSUNAMI SYSTEMS ENGINEERING

The Tsunami Seismicity Program was initiated and sponsored by NOAA. The work for design, development, test and evaluation for one prototype tide sensor and one prototype seismic sensor at the Albuquerque Seismological Center is in conjunction with an interagency agreement between USGS and NOAA. The prototype tide sensor will collect in digital form the analog tide data. An interrogation command over the GOES system will cause the tide sensor to transmit back over the GOES system the last forty words of tide data. The prototype seismic sensor will detect large seismic events and record time of first arrival. This will activate a tsunami alarm signal that will be transmitted over the GOES system. The station will also respond to interrogation commands and will transmit the last four time of arrival data words over the GOES system. Also, under agreement with NOAA the Albuquerque Seismological Center will provide general support for all existing TWS seismic stations.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

## HAZARD REDUCTION

### 13.0012, EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA

T.C. ROYER, Univ. of Alaska, Inst. of Marine Sciences, Fairbanks, Alaska 99701

A station will be established on Middleton Island in the Gulf of Alaska to collect and analyze wave data. It is expected to provide information about all long waves, but is particularly suited to investigate the existence of small amplitude tsunamis generated by low magnitude earthquakes. Wave data obtained at this station would possess a minimal amount of contamination due to normal mode and continental effects. Records from this station will be part of an array at other similar island stations, to provide a measure of the wave dispersion. Analysis of the data records will also provide an estimate of the ability to measure continental shelf oscillations and edge waves from such a station.

SUPPORTED BY U.S. Natl. Science Foundation

### 13.0013, ALASKA GEOLOGIC EARTHQUAKE HAZARDS

G. PLAFKER, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: Alaska.

The specific project objectives are to reduce and evaluate risk in Alaska from tectonic displacement, seismic shaking, and secondary geologic effects. A more general goal is to gain an insight into tectonic processes within the seismically active zone of southern Alaska.

Initially, research efforts will be concentrated in the highly seismic southern part of the State where most of the population and economic development are concentrated. This research will later be extended into the southeastern and central parts of the State. Geological research under this project will be closely coordinated with parallel geophysical projects by the Office of Earthquake Research.

The geologic studies will involve: 1) preparation of detailed maps of active surface faults and evaluation of geologic evidence for late Cenozoic fault movement; 2) delineation of coastal areas that may be subjected to major earthquakes characterized by large-scale regional tectonic elevation changes and assessment of the hazards related to such movements (notably seismic shaking, tsunamis, seiches, and regional warping); 3) identification and evaluation of secondary geologic hazards related to seismic shaking in critical areas.

spreading and compaction); and OERCS) of a synthesis of pertinent processes in the seismically active transform fault system in southeast Alaska, to provide information on the northeastern extension of the Aleutian into south-central Alaska, to provide information on the areas within which earthquake hazards in south Alaska are being evaluated.

SUPPORTED BY U.S. Dept. of Interior

### 13.0014, ACTIVE FAULTS AND GEOMORPHOLOGY FROM PT. MUGU TO WILMINGTON, CALIFORNIA

H.C. WAGNER, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California

Topical studies related to earthquake hazards in the California borderland, with geologic research and evaluation spinoff. Major objective of the project is to construct the depositional and structural history of the offshore faults as a means of evaluating earthquake hazards, tsunamis, landslides, or slides related to building construction or to major population growth. The geologic research will increase knowledge of offshore parts of the borderland and will provide a means of evaluating subsurface economic resources (e.g., oil, gas, phosphate, manganese, oil and gas).

SUPPORTED BY U.S. Dept. of Interior

### 13.0015, TSUNAMI RESEARCH AND APPLICATIONS

L. HWANG, Tetra Tech Incorporated, San Diego, California 92107

This project will undertake the development of a model to appraise the potential tsunami risk of a coastal area. The model and computational methodology that is capable of describing: (1) tsunami generation; (2) wave propagation including directivity, transverse effects, depth, dispersion, and so forth; (3) coastal response including bays and estuaries, and inundation of low-lying areas.

Particular attention will be devoted to the study of tsunamis generated by fault movement near the source, and the propagation of the wave parallel to the coast.

SUPPORTED BY U.S. Natl. Science Foundation

### 13.0016, NAVY ENVIRONMENT - IMPACT OF OCEAN WAVES AND RESPONSE OF HARBORS TO TSUNAMI AND LONG WAVES

J.W. MILES, Univ. of California, Inst. of Marine and Coastal Phys., San Diego, California 92038 (6005)

The Navy has a continuing requirement for a better understanding of the creation and behavior of ocean waves since knowledge of the phenomena taking place in the environment has application to ship motion and stability. The results of this research on the interaction of ocean waves and their interactions, will be used to more accurately predict wave actions in a number of Naval applications, such as the design of harbors, breakwaters, and other coastal structures.

Research will continue on wave generation and hydrodynamic stability with particular emphasis on the resonant response of harbors to tsunamis and other long waves.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

### 13.0017, ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA

R.W. LEMKE, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Alaska.

Reconnaissance engineering geology studies, directed principally toward assessing potential earthquake and other geologic hazards, have been completed in the following Alaska coastal towns: Skagway, Haines, Sitka, Ketchikan, Metlakatla, Petersburg, Wrangell, Yakutat, Hoonah, Nome, Bethel, Dillingham, Naknek-King Salmon, Unalakleet, Kotzebue, and Barrow. It is concluded that most parts of these towns are built on more stable geologic materials than those beneath towns heavily damaged by the 1964 Alaska earthquake. Nevertheless, in the event of a large earthquake, some communities are susceptible to damage because of amplified shaking in poorly consolidated deposits, slides of rock and snow, ground fissuring, flowing sediments caused by liquefaction, and subsidence due to soil compaction. In addition, harbor areas and other low-lying parts of some towns may be damaged by vertical changes in the land, by seismic sea waves, and by other abnormal waves produced locally by land tilting or by submarine landsliding.

Reports on the southeastern Alaska region, Haines, and Skagway have been released in open file, and reports are in various stages of preparation for the other communities. As of early 1973, this large project has been restructured, and report preparation responsibilities for Sitka, Metlakatla, Hoonah, Yakutat, Bethel, Naknek-King Salmon, and Unalakleet assigned to project 9550-00948.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

### 13.0018, RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA

J.T. MCGILL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Alaska.

A reconnaissance engineering geology report on the Sitka area, Alaska, will be released in open files in 1974. It emphasizes possible effects of future major earthquakes and also evaluates other geologic hazards. Although the report notes that little damage occurred during the nearby July 30, 1972, earthquake of magnitude about 7.3, earthquake effects during future earthquakes might include sudden tectonic displacement of land, ground shaking, liquefaction of certain granular deposits, ground fissuring, differential compaction of some surficial deposits, and various types of slope failures; low-lying ground might be inundated by seismic sea waves or other earthquake-caused water disturbances. Geologic hazards other than earthquakes include stream flooding, storm waves and other high waves, landsliding, and possible volcanic eruptions.

A reconnaissance engineering geologic report on the Metlakatla area, Alaska, is in preparation. Reconnaissance reports are planned for the following coastal communities in Alaska:

UNKNOWN, U.S. Army, Coastal Engin. Res. Center, Washington, District of Columbia 20016

Purpose of study/investigation: To gain an improved understanding of the creation, propagation and transformation of long waves; particularly tides, storm and hurricane surges, and tsunamis.

Approach or plan: Research and development on long-period waves and surges including theoretical, laboratory, and field studies of surging in harbors; the prediction of changes in tidal currents and heights caused by changes in channels and basins; the prediction of storm surge heights at coastal locations; and the generation, travel, and effects of tsunami waves.

Progress to date: In-house efforts included storm surge calculations, in which the grid system was established for the two-dimensional mathematical model of long-wave propagation in Pamlico Sound, and a one-dimensional numerical solution for the 'enclosed basin surge problem' was developed and included in the forthcoming CERC shore protection manual, and supervision of WES activities in connection with mathematical models of harbor surges and University of California's efforts in connection with tsunami studies. Contract studies on storm surge calculations included numerical studies of gravity waves by Texas A and M University in which a mathematical storm surge model for computing water levels in Lake Okeechobee was formulated along with a supporting computer program, and Hillsborough Bay digital computer model is being verified by the University of Southern Florida. Three reports pertaining to tsunami studies were received from the University of California. Study of two-dimensional long waves by Texas A and M University has resulted in a final report and six earlier reports and six papers in scientific journals.

SUPPORTED BY U.S. Dept. of Defense - Army

### 13.0020, NUMERICAL SIMULATION OF TSUNAMIS

C.L. MADER, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Honolulu, Hawaii 96812

Abstract: Two-dimensional, time-dependent, nonlinear, incompressible, viscous flow calculations were performed of realistic models of tsunami waves interacting with continental slopes and shelves. Wave heights were observed to grow by a factor of 4 as they shoaled up a 1/15 continental slope. The second or third wave often exhibited the largest wave run-up. Comparisons with shallow water, long wave calculations showed similar results except for short wavelength tsunamis. The damping action of submerged barriers on tsunami waves was investigated. Significant amounts of the energy of a tsunami may be reflected by submerged barriers. The numerical simulation of tsunami waves can provide realistic descriptions of their flow.

Pub. Feb. 73: 56p., NTIS No. COM-73-11321/9: PC \$5.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 13.0021, PACIFIC TSUNAMI CATALOG

D.C. COX, Univ. of Hawaii, School of Arts, Honolulu, Hawaii 96822

A catalogue of tsunamis that have occurred in the Pacific Ocean will be prepared that collects all recorded and observed data available. The catalogue and subsequent analysis will be completed with cooperation of Japanese and Russian collaborators. The data base will be analyzed for the follow-

G.R. MILLER, Univ. of Hawaii, Hawaii Inst. of Geophysics, Honolulu, Hawaii 96822

**Abstract:** The departures in the spectra of tsunamis at a fixed station are compared to the normal tsunami spectrum at this station. By examining these spectral ratios, one removes the effect of local resonances and compares the generation spectra for different locations. The spectral ratios are smooth as compared to the spectra themselves, thus indicating an absence of strong resonances in the relatively rich in low frequencies.

Pub. May 72: 21p., NTIS No. COM-72-11261; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 13.0023, RECENT TSUNAMI THEORY

R.W. PREISENDORFER, Univ. of Hawaii, Hawaii Inst. of Geophysics, Honolulu, Hawaii 96822

**Abstract:** Recent developments in the mathematical analysis of tsunami development are discussed. Five main phases of the tsunami development are described and modeled. These phases are: generation and uniform propagation; scattering and diffraction; guiding, trapping, and radiation; oscillations and resonances; and shoaling, breaking, and run up.

Pub. Aug. 71: 59p., NTIS No. COM-72-10105; PC \$3.00 MF \$0.95

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 13.0024, TSUNAMI SHORELINE TRACT

G.P. WOOLLARD, Univ. of Hawaii, Hawaii Inst. of Geophysics, Honolulu, Hawaii 96822 (21650202)

**Technical objective:** Examine effects of shorelines where tsunami waves interact with irregular features such as harbors, points and generally varying topography.

**Approach:** Modify existing numerical techniques and apply them to the tsunami generation and run-up problem in two dimensions. Solution of the three dimensional topography problem should be started during this research year.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

### 13.0025, THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS

UNKNOWN, U.S. Dept. of Commerce, Natl. Ocean Survey, Rockville, Maryland 20852

**Abstract:** The March 28, 1964, tsunami caused little damage and no loss of life in Hawaii. The highest water levels were generally about 10 ft on the northern or exposed shores of the islands, locally up to 16 ft. Maps of runup heights are shown. The successive crests of the tsunami quickly became out of phase with natural modes of Hilo Bay so that the 'Hilo Tsunami Problem' did not materialize. Energy, coherence, and quadrature spectra of the tsunami at Midway, Honolulu, Kahului, and Hilo are shown. The low coherence between these stations does not support the hypothesis that a coherent source of waves was emanating from the Gulf of Alaska. The energy decay curve has several peaks that can be identified with reflections from North America, Kamchatka, Mexico, and Australia. The mean frequency of the incoming energy changes with time in a peculiar way, but not so as to support the hypothesis that energy is being converted from lower to higher frequencies, at least during the initial phase of the tsunami.

G.H. KEULEGAN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** The important wave parameters to be considered in tsunami model studies are wave height and period, and wave front orientation. The first two of these parameters are determined by marigraphic measurements or by visual observations; however, wave-front orientation has never been accurately observed at the problem site (Crescent City, Calif.). A digital computer program was written to plot wave front orientation from three recent epicentral locations to Crescent City to obtain approximate tsunami-front orientations. The resulting diagrams were checked by comparing the computed arrival times of the wave fronts. The actual arrival times were obtained from recording tide stations at Crescent City and Hilo, Hawaii. Initial wave-front orientations relative to earthquake epicenter were either assumed or taken from the literature. A tentative frequency relation was derived from the risk-duration relation was prepared from the frequency relation. The selected values of the test-wave dimensions (height and period) and orientation determined, to a considerable extent, the model configuration necessary to ensure results sufficiently accurate for purposes of the model study. Since experience in the design and operation of long-period wave models is scant, it was deemed necessary to conduct preliminary tests utilizing a pneumatic wave generator in a two-dimensional flume. The results of these tests were compared with theoretical predictions from an idealized mathematical model and on the basis of these tests, a preliminary model design was proposed.

Pub. Jun. 69: 118p., NTIS No. AD-723 965; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### 13.0027, A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL

G.H. KEULEGAN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Abstract:** The report examines the motion of the sea off Hilo Bay, Hawaii prior to a pilot model study for the design of Hilo Harbor tsunami model.

Pub. Apr. 67: 48p., NTIS No. AD-735 844; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### 13.0028, TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY

R.W. WHALIN, U.S. Army, Waterways Experiment Station, Vicksburg, Mississippi 39180

**Purpose of study/investigation:** To predict the runup along the southern coast of California and three sites in Alaska from possible tsunamis occurring in the Pacific Ocean for flood insurance studies.

**Approach or plan:** To delineate probable areas of coastal inundation from tsunamis at various locations in California and Alaska. A detailed refraction analysis will be made of the propagation of a design tsunami from various seismic regions of the Pacific Ocean to the coastal areas of interest. Various 'state of the art' numerical techniques applied to tsunami generations, propagation, and runup over the Pacific Ocean will be utilized in this study.

## MAJOR DISASTER TYPES

14.0004,

**Progress to date:** An extensive literature survey of tsunamis was completed. Water depth grids for deep ocean areas were established and historical data and wave refraction diagrams of the offshore southern California area were studied to aid in determining design tsunami source areas used as input to the tsunami generation program. Deep ocean wave refraction diagrams for tsunamis originating in both South America and Alaska have been completed. The tsunami generation and deep ocean propagation computer program developed by Tetra Tech, Inc., has been successfully utilized for test cases of tsunamis generated in Alaska and will be utilized for tsunamis generated in other areas.

**SUPPORTED BY** U.S. Dept. of Defense - Army

### 13.0029, THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING DEPTH - OFF-SHORE BEHAVIOR

**E. VARLEY**, Lehigh University, Ctr. for the Appl. of Math., Bethlehem, Pennsylvania 18015

**Abstract:** A theory is presented which describes the propagation of large amplitude Tsunamis across a basin of variable depth in the limit when this depth is varying slowly on a scale defined by the wavelength. In Part I only the off-shore behavior is considered, in Part II some features of the final runup are described. The technique used is to regard the wave as a slowly modulated simple wave with a slowly changing Riemann invariant. One of the most significant results is that over distances where the effect of depth variation modulates the amplitude of the wave, but does not disperse it, the variations of the amplitudes of the flow variables, such as maximum surface elevation, can be calculated as functions of the undisturbed depth without knowing how this depth varies in distance and without knowing the wave profile.

**Pub. Jun. 71:** 52p., NTIS No. AD-730 376; PC \$3.00 MF \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

## 14. VOLCANOES

### PUBLIC ASSISTANCE

#### 14.0001, VOLCANIC HAZARDS ON THE ISLANDS OF HAWAII

**D.R. MULLINEAUX**, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Assemble scientific and technical data and experience to assist the establishment of criteria for guiding HUD participation in areas with volcanic hazards on the Islands.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

### DISASTER MITIGATION

#### 14.0002, SATELLITE VOLCANO SURVEILLANCE

tion was completed in 1972 on the volcanoes St. Augustine and Iliamna in Alaska, Kilauea in Hawaii, Baker, Rainier and St. Helens in Washington, Lassen in California, and at a site near Reykjavik, Iceland. Installation continues and should be completed in April 1973 on the volcanoes Santiaguito, Fuego, Agua and Pacaya in Guatemala, Izalco in El Salvador and San Cristobal, Telica and Cerro Negro in Nicaragua. The data available to date show that the instruments are working quite reliably.

**SUPPORTED BY** U.S. Dept. of Interior - Geological Survey

#### 14.0003, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

**J.T. ALFORE**, State Div. of Mines & Geology, Sacramento, California 95814

**Abstract:** This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

**Pub. Jun. 73:** 111p., NTIS No. PB-222 447/5; PC \$7.75 MF 1.45.

**SUPPORTED BY** U.S. Dept. of Housing & Urban Development

#### 14.0004, HAWAIIAN VOLCANO OBSERVATORY

**D.W. PETERSON**, U.S. Dept. of the Interior, Geological Survey, Honolulu, Hawaii 96814

States to which project pertains: Hawaii.

Despite their reputation for mild activity, Hawaii's basaltic volcanoes pose a continual threat to life and property, and major aims of the Hawaiian Volcano Observatory are to provide warnings of impending eruptions and advice about volcano-related hazards. To achieve these aims, a wide variety of geologic, geophysical, and geochemical studies are carried out to improve the understanding of volcanic processes. Eruptions are studied in great detail, including describing and recording eruptive events and associated phenomena, sampling eruptive products, making photographic records, and mapping vents and flows. Seismic activity is continuously monitored by a network consisting of about 36 stations. Several thousand earthquakes are recorded annually, and their locations and magnitudes are determined by computer. Vertical and horizontal ground deformation is measured by regularly reoccupying tilt stations, leveling lines, and a trilateration network of geodimeter stations. Additional

DOUBT AND SPURR VOLCANOES, COOK INLET, ALASKA

J. KIENLE, Univ. of Alaska, Geophysical Institute, College, Alaska 99735

Very little data exists on the eruptive behavior of Alaskan volcanoes. This project is to improve the seismic surveillance of Augustine Volcano and to initiate similar surveillance systems at Redoubt and Spurr. All three are active volcanoes. By locating hypocenters in space and time, one may be able to determine the source of magma generation, path of magma migration and magma storage areas.

SUPPORTED BY U.S. Natl. Science Foundation

#### 14.0006, GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA

D.A. SWANSON, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

Small geodimeter networks are being installed and measured on several Cascade volcanoes in order to monitor possible ground displacements before future eruptions. The networks will be remeasured periodically, probably every 2 to 4 years unless conditions warrant otherwise. Some or all of the following volcanoes will be monitored: Washington (Baker, Rainier, St. Helens, Adams); Oregon (Hood, Jefferson, Belknap Crater area, Sisters, Crater Lake); California (Shasta, Lassen). The networks involve triangles or quadrilaterals several kilometers on a side. Strain parameters will be computed, and displacements of stations on the volcano will be determined relative to stations on bedrock away from the volcano.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0007, VOLCANIC HAZARDS IN THE CASCADE RANGE - CALIFORNIA AND WASHINGTON

D.R. CRANDELL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

Volcanic rocks and surficial deposits of postglacial age are being studied and dated at Lassen Peak and Mount Shasta in California, and Mount St. Helens and Mount Baker in Washington in order to infer the kinds and frequency of the events they represent and the areas affected, for the purpose of evaluating potential geologic hazards at communities, campgrounds, and reservoirs that could be affected. Maps are being prepared where needed to show areal distribution of various kinds of hazards. Where appropriate, recommendations are made to responsible authorities concerning actions to be taken prior to and during volcanic eruptions in order to minimize danger to life and property.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0008, THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

Under the auspices of a comprehensive geothermal remote sensing project, the present project is designed primarily to test and evaluate aerial, and where suitable, satellite infrared scanning techniques and concomitant ground observations in geothermal studies, both as reconnaissance and mapping tools. The goal of this project is (1) to utilize quantitative

thermal areas, (2) to analyze the planimetric distribution of anomalies in relation to structure and geophysical anomalies and (3) ultimately to determine radiative and other energy loss from the terrestrial surface in geothermal areas. In application of these techniques to volcanic systems the goal is similar, and in addition, we shall estimate minimum thermal energy yields during repose periods of volcanoes, as a base of reference for comparison with future periods of activity and as an aid in understanding the overall energy budget of volcanic systems.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0009, THERMAL SURVEILLANCE OF ACTIVE VOLCANOES

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

Abstract: The author has identified the following significant results. By the end of 1973, aerial infrared scanner traverses for thermal anomaly recordings of all Cascade Range volcanoes were essentially completed. Amplitude level slices of the Mount Baker anomalies were completed and compiled at a scale of 1:24,000, thus producing, for the first time, an accurate map of the distribution and intensity of thermal activity on Mount Baker. The major thermal activity is concentrated within the crater south of the main summit and although it is characterized by intensive solfataric activity and warm ground, it is largely subglacial, causing the development of sizable glacier perforation features. The outgoing radiative flux from the east breach anomalies is sufficient to account for the volume of ice melted to form the glacier perforations. DCP station 6251 has been monitoring a thermally anomalous area on the north slope of Mount Baker. The present thermal activity of Mount Baker accounts for continuing hydrothermal alteration in the crater south of the main summit and recurrent debris avalanches from Sherman Peak on its south rim. The infrared anomalies mapped as part of the experiment SR 251 are considered the basic evidence of the subglacial heating which was the probable triggering mechanism of an avalanche down Boulder Glacier on August 20-21, 1973.

Pub. Jan 74: 6p., NTIS No. E74-10418: PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

#### 14.0010, VOLCANIC HAZARDS, ISLAND OF HAWAII

D.R. MULLINEAUX, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

States to which project pertains: Hawaii.

The frequency of volcanic eruptions, and the distribution and effects of eruptions and of associated ground movements, are reviewed in order to delineate several zones on the island that have different relative exposure to direct or indirect volcanic hazards. In preparation are a map that shows zones of relative exposure to such hazards, and an accompanying report that describes the hazards, their effects, criteria used to delineate the hazard zones, and the kinds of volcanic activity typical of the island of Hawaii.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0011, EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO

S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

Principal objective is to coordinate Survey investigations and to encourage other geologic studies of the Snake River Plain region for the derivation of land resource information useful to planners and decision makers.

Aims are: To minimize earthquake, slide, and volcanic hazards in this northern part of the Wasatch seismic belt. To help in the development of wise environmental policies for extensive public lands. To provide data for planning and management of this balanced agricultural and urban region, a populous and growing part of Idaho. To develop a better geologic framework for aquifer and waste-disposal models of a region where increasing wastes threaten a major aquifer. To evaluate the mineral resource and geothermal potential of the region.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0012, SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO

D. SCHLEICHER, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

This project is part of a study of the eastern Snake River Plain, whose aim is to gather geologic data needed for land-use planning. I plan to prepare one or more maps at scales 1:250,000 and larger showing geologic units and structures that represent hazards or resources. In the core of the Beaverhead Mountains, the main emphasis will be on working out the stratigraphy as to decipher the structures that can be extrapolated beneath the volcanic rocks of the Snake Plain. On the surrounding flats and the flanks of the range, the plan is to map the young volcanic rocks and sediments, to identify and date young faults and volcanic eruptions, and to note other potential hazards.

The study area is bisected by the southern end of the Beaverhead Mountains, which are cored by Mississippian and Pennsylvanian carbonates and quartzites, whose stratigraphy remains poorly known. The rocks are slightly to severely deformed, with local complex folding and thrusting. The range is separated from the surrounding flats by range-front faults; the faults are probably younger on the west side of the range than on the east where they are mantled by ashflow tuffs intercalated with tuffaceous, partly cemented fan gravels that are probably a few million years old. The absence of young faults accords with the absence of epicenters reported here during this century. The area has geothermal potential, reflected by Lily Hot Springs and the springs feeding Warm Creek, and suggested by a hitherto-unrecognized intrusive plug at the south end of the Beaverheads. Extensive alluvial aprons may yield water, and areas of silty soil (reworked loess?) may prove arable.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0013, SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO

P.L. WILLIAMS, U.S. Dept. of the Interior, Geological Survey, Denver, Colorado 80225

The purpose of the project is to geologically map, at scales of 1:250,000 and larger, the volcanic rocks of the eastern Snake River Plain and its margins. Major scientific objectives are to delineate the late Cenozoic volcanic and tectonic history in detail, to locate eruptive centers for basalt flows and for

mental aspects of trace element distribution, aquifers and liquid waste disposal sites, potential recreation areas, and other topics needed for land-use planning.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0014, REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII

R.L. SMITH, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

This project is an inquiry into the nature of the relationship between volcanism and geothermal resources. An attempt will be made to discover what, if any, systematic relationships exist among specific types of volcanic systems, hydrothermal systems, and geothermal anomalies. The project is oriented toward the development of criteria that may be useful; 1. as guides for geothermal exploration, 2. for better understanding of volcanic activity and processes, 3. for the conceptualization of magma chamber models.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 14.0015, RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I)

J.B. FINLAYSON, Univ. of Hawaii, Water Resources Research Ctr., Honolulu, Hawaii 96822

The proposed research plan involves field and laboratory studies to determine the extent and type of contamination that occurs in rainwater, resulting from the injection of volcanic fume (gases and particulates) into the atmosphere by Kilauea volcano. Initially, only sulfur dioxide and hydrogen, sulfate and fluoride ions, known components of the fume, will be studied.

Field work would involve the establishment and operation of sampling-monitoring stations (minimum of four) for the following purposes: 1. Collection of rainwater (and fog drip), gas and particulate samples in areas downwind from the volcano. 2. Meteorological monitoring (wind speed and direction, etc.) to determine the distribution of fume and rainwater in the areas of study.

Laboratory work would include the following: 1. Analysis of collected samples by conventional methods, modified as needed for this study. 2. Continued development of new or existing methods for the collection and analysis of the type of samples to be encountered in the project.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

#### 14.0016, SEISMIC ACTIVITY OF THE CASCADE VOLCANOES

S.W. SMITH, Univ. of Washington, School of Arts, Seattle, Washington 98105

Earthquakes directly associated with volcanoes are several basic types. One type is indistinguishable from ordinary tectonic earthquakes produced by faulting. These are usually scattered around the volcano with focal depths of 1-20 kilometers. A second type is the volcanic, or type 'B' earthquake which is usually located at a shallow depth near the volcano's summit. The envelope of such an event consists of an emergent arrival and a more gradual decrease in amplitude. The mechanism for these events has never been adequately explained. Both of these types of volcanic



## 15.0001, COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION

A.S. TETELMAN, Univ. of California, School of Engineering, Los Angeles, California 90024

**Objectives:** The objectives of this project are to investigate the possibility of using high-strength composite materials in ocean construction, to provide long-life low-cost coastal constructions and facilities. This involves study of both the properties needed for such structures, and the factors controlling fracture in appropriate materials in the salt-water environment.

**How information will be applied:** In the building of new marinas and public beaches, erosion can be controlled by construction of jetties, groins and breakwaters; tough corrosion resistant composite material shows promise for containment of fill material for more economical construction.

**Accomplishments during the past twelve months:** Established a strain-rate effect on the fracture load of notched and unnotched polymer-impregnated concrete. Studies of crack propagation rates in plain and polymer-impregnated concrete as a function of environment have been initiated. Corrosion studies on P.V.C. coated wire mesh exposed for 10 years in seawater is in progress.

For additional information pertaining to this project contact Dr. George G. Shor, Jr., Scripps Institution of Oceanography, La Jolla, California 92037.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

## 15.0002, FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSSLANDS OF THE SOUTHWEST

R.M. RICE, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Exp. Sta., Riverside, California 92507 (PSW1604)

**Objective:** Gain understanding of runoff and erosion processes of steep, unstable mountain chaparral watersheds and their contribution to downstream floods and sedimentation. Develop effective land management practices to combat excessive runoff and erosion, as emergency following fires and for long-term environmental stability.

**Approach:** Excessive post-fire erosion attacked by studying hydrophobic soils, their chemo-physical nature and relations, and tests of measures to counteract them. Long-term environmental stability sought by ecological approach, including study of site potentials. Relationships between storms and floods studied by investigation of processes, and development of estimation techniques through analyses of existing watershed data.

**Progress:** Soil water repellency is a frequently encountered site factor that can influence the success of various forestry practices. Severe water repellency is usually the result of fire, but humus and its related microorganisms may also produce repellency. Water repellency may induce excessive runoff and erosion in a burned area. Water repellency also affects relations between soil, water and plants. Adverse affects of water repellency can be eliminated by mechanically disrupting the water-repellent barrier. Under some conditions, treating the affected areas with wetting agents may soon be feasible. A survey of water-repellent conditions is desirable for appraisal of a forest site for various cultural practices. A wetting agent was applied by sprinkler irrigation to a burned watershed as an erosion control measure. The wetting agent decreased production of mustard (*Brassica* spp.) and in-

duced the wetting agent suppressed the growth of mustard seedlings and had a less suppressive effect on ryegrass seedlings. The differential physical properties of the two species are presumably responsible for much of the difference in grass and mustard seedling establishment in the burned area.

SUPPORTED BY U.S. Dept. of Agriculture - Forest Service

## 15.0003, URBAN GEOLOGY PLAN FOR CALIFORNIA: THE NATURE, MAGNITUDE, & COSTS OF SEISMIC HAZARDS & RECOMMENDATIONS FOR MITIGATION (ABBREVIATED)

J.T. ALFORE, State Div. of Mines & Geology, Sacramento, California 95814

**Abstract:** This report recommends loss-reduction measures for 10 geologic problems which collectively threatened \$55 billion loss in California's urban areas by the year 2000. The problems are earthquake shaking, landsliding, mineral resources to urbanization, landsliding, erosion activity, expansive soils, fault displacement hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of various reduction measures, and agencies responsible for their implementation.

Pub. Jun. 73: 111p., NTIS No. PB-222 447/5: \$1.45.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

## 15.0004, CONCRETE BLOCK REVEGETATION: BENEDICT, MARYLAND

J.V. HALL, U.S. Army, Coastal Engin. Res. Center, District of Columbia 20016

**Abstract:** Although the project has been completed in one year, it has protected the backshore area from winter storms. Figure 9 shows comparative photographs before and during construction, at completion, and later. The problem of protecting banks and lower reaches of rivers entering Chesapeake Bay, has always been difficult since problem areas consist of small parcels of land in cottages in individual ownership. Many owners expend large sums of protection. As a result, a low-cost, do-it-yourself method of shore protection is numerous. The method outlined herein appears to meet requirements. This system can no doubt be used by owner on a do-it-yourself basis at a cost even less than contract price for the protection at Frying Pan summer camp.

Pub. Jan. 64: 15p., NTIS No. AD-440 882: HC \$3.00

SUPPORTED BY U.S. Dept. of Defense - Army

## 15.0005, KENNEDY SPACE CENTER COASTAL EROSION - FLORIDA

A.J. MEHTA, Univ. of Florida, School of Civil Engineering, Gainesville, Florida 32601

**Abstract:** Dune barrier erosion and possible breaching to storm and hurricane wave activity is being studied at Mosquito Lagoon, in Kennedy Space Center. Results of a geological as well as hydrodynamic study of the problem area indicate that no inlet has existed since dune barrier since 500 A.D., and that there is li-

of a possible breakthrough inlet remaining open permanently, primarily because the relatively shallow lagoon does not contain enough volume of water to maintain an inlet between the ocean and the lagoon. It is therefore recommended that only minimal measures, such as closing up the man-made passes across the dunes, be carried out to ensure continuation of the action of natural beach maintaining processes.

Pub. Jun 73: 66p., NTIS No. N73-33337/9: PC \$5.50 MF \$1.45.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

**15.0006, BAL. HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA**

*UNKNOWN*, U.S. Army, Engineer District, Jacksonville, Florida

**Abstract:** An 0.85-mile reach of the Dade County, Florida, Beach Erosion Control and Hurricane Protection Project will be partially restored at Bal Harbour Beach for a protective and recreational beach. Project fill would be obtained from an ocean borrow pit about 1.5 miles offshore in elevations of -36 to -50 feet. About 1.8 million cubic yards of sand will be dredged from an ocean borrow pit and placed along 0.85 mile of beach for restoration of protective and recreational assets. There will be some temporary turbidity and siltation in the borrow and fill areas during construction. Some marine life will be destroyed; however, these populations are expected to become reestablished.

Pub. May 72: 55p., NTIS No. EIS-FL-72-5591-F: PC \$4.75 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**15.0007, Jekyll Island, Georgia, Beach Erosion Control and Hurricane Protection**

*UNKNOWN*, U.S. Army, Engineer District, Savannah, Georgia 31402

**Abstract:** The project proposes restoration and periodic nourishment of 27,000 feet of ocean beach and construction of a 1,000 foot rubblestone terminal groin. Environmental impacts include: Restoration and maintenance of ocean beach, stabilization of eroding shoreline, increased nesting sites for loggerhead sea turtles, enhancement of recreational facilities, improved economic prospects, and continued maintenance of island's aesthetics. Adverse environmental effects include: temporary increased water turbidity and disruption of benthic, plankton and nekton communities during construction; after project completion, probable increased mortality rate of young loggerhead sea turtles.

Pub. Aug 73: 50p., NTIS No. EIS-GA-73-1315-D: PC \$4.50.

SUPPORTED BY U.S. Dept. of Defense - Army

**15.0008, PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESERVOIR SYSTEMS**

*J.A. WILSON*, Iowa State University, Water Resources Research Inst., Ames, Iowa 50010

**Abstract:** This research project was initiated to examine the natural establishment of plant species in shallow water and on recently exposed mudflats following the annual release of floodwaters in Iowa's large reservoir systems, and determine

vegetated. This esthetically pleasant area has relatively little soil erosion and provides manageable natural areas for man and wildlife. On the other hand, the impact of extreme fluctuations in the water level of the Coralville flood pool is strikingly visible. Dead standing trees, spectral remnants of the original forest, dominate the upper reaches of the flood pool landscape. Mud and debris characterize the area immediately following the recession of floodwaters.

Pub. Jul 73: 78p., NTIS No. PB-226 347/3: PC \$3.75 MF \$1.45

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T.

**15.0009, STATEN ISLAND BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, STATEN ISLAND, NEW YORK**

*UNKNOWN*, U.S. Army, Engineer District, Watervliet, New York 12189

**Abstract:** The report describes the beach erosion control and hurricane protection project consisting of the placement of dune and beach fill, the construction of levees and groins, the realignment of interior streams, and the improvement of interior drainage by use of pumping stations and ponding areas. The project will afford protection against hurricanes and control of beach erosion, resulting in the reduction of the possibility of loss of life, business and property damages, and enhancing the recreational value of the shore. Construction of the project would cause minor interruption of traffic. This condition would cease once the project is completed.

Pub. Sep 72: 11p., NTIS No. EIS-NY-73-0068-D: PC \$3.00.

SUPPORTED BY U.S. Dept. of Defense - Army

**15.0010, BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE**

*UNKNOWN*, U.S. Army, Engineer District, Philadelphia, Pennsylvania 19137

**Abstract:** The project provides for improvements along the Atlantic Coast of Delaware extending from Cape Henlopen to the Maryland State Line at Fenwick Island. Those improvements include combined beach erosion control and hurricane protection and consists of widening 24.5 miles of beach by placement of suitable sand to provide a berm. In the built-up sections of Rehoboth, Dewey, and Bethany Beaches where dune construction is impractical, approximately 17,700 linear feet of timber bulkheads with stone toes will be constructed. Use of borrow areas and dredging might have negative environmental impact which can be minimized by careful selection of dredging locations and confining the dredging operation to favorable time periods. A temporary increase in turbidity during construction which would have minimum impact on fishery.

Pub. Jun. 71: 21p., NTIS No. PB-199 454-F: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**15.0011, VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION**

*UNKNOWN*, U.S. Army, Engineer District, Norfolk, Virginia

**Abstract:** A hurricane protection and beach erosion control project is proposed, consisting of sheet pile walls capped with concrete, raising and widening the beach, and recommendation of certain non-structural measures at Virginia Beach.

Preliminary studies have shown that the factors influencing the hydraulic erosion of saturated soils are the amount and type of clay, and the composition of the pore and eroding fluids. The amount and type of clay can be characterized (without destroying the sample) by the magnitude of dielectric dispersion. The compositions of the pore and eroding fluids can be quantified by their conductivities and the sodium adsorption ratio. The shear stress for initiation of erosion can be evaluated by determining the erosion rates that result when various shear stresses are applied to a soil in a rotating-cylinder apparatus. This study seeks a functional relationship among these parameters. The results with several clays will be used to develop soil nomograph for use by agriculturists, engineers, and land-use planners.

SUPPORTED BY U.S. Natl. Science Foundation

#### 15.0013, SAN FRANCISCO BAY

D. MCCULLOCH, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

Principal objectives are to provide descriptions of natural processes (geological, seismological, biological, geochemical, hydrographical) to serve as a basis for enlightened use of this major estuary. More specifically, goals are to 1) describe geology, tectonic history, seismic environment and distribution of unconsolidated sediment in the fault-bounded bay basin and on the adjacent continental shelf, 2) describe gross water circulation patterns in the bay and adjacent Pacific as a guide to movement of natural and man-introduced dissolved and solid constituents, 3) describe species composition and aerial distribution of major benthic organism communities, 4) evaluate rates and processes by which trace metals, trace elements and synthetic organic compounds are introduced into the bay, how they are partitioned, and their ultimate fate; includes stream sediment sampling in the drainage basin, analysis of suspended and bottom sediment in the bay and adjacent continental shelf, and analysis of the dissolved phase, 5) establish biological uptake of trace elements, trace metals and synthetic organic compounds by indicator species of benthos, phytoplankton and marine algae, 6) describe distribution of modern bay sediment, the major modes of sediment transport and evaluate rates of deposition and erosion.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 15.0014, SHORT-TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA

J.D. HUME, Arctic Inst. of North America, Washington, District of Columbia 20009

Abstract: Records of shoreline and bluff positions in the vicinity of Barrow, Alaska have been obtained from aerial photographs and taped measurements for intervals between 1948 and 1969. Although the source material in the bluffs is frozen and masses of pure ice are present, temperature and rainfall data fail to show any marked correlation with the retreat of the bluff faces or with the retreat of the fronting or downdrift beaches. Removal of beach material for construction and frequency of storms from the west do show a relationship. Recorded retreats of the bluffs up to 3 m. per year and of the beaches up to 4 m. per year have resulted where there has been excessive beach borrow or where a series of severe storms have attacked the coast.

Pub. 1972: 9p., NTIS No. AD-760 210: Reprint.

Purpose of study/investigation: To procure and develop data on all types of shore improvement structures and methods, to be used to determine their effectiveness, and to develop new criteria or changes in existing criteria applicable to functional and structural design of future structures.

Approach or plan: Data are collected both before, during, and after construction of shore structures, including repeated surveys, material sampling, littoral forces (to extent possible) and that relating to techniques and materials of construction. Data may also be collected from prototype experimental structures in the field, or small scale wave tank studies.

Progress to date: In connection with follow-up studies, data collection and processing were continued at 14 wide-range locations involving beaches and related projects. A final report was received from the University of Florida on a cooperative study with the State of Florida to evaluate beach nourishment at Treasure Island, Fla., as well as a preliminary report concerning Key Biscayne and Virginia Key. Data collection on behavior of beach and underwater bottom slopes updrift and downdrift of prototype experimental groin structure (PEG) at Point Mugu, Calif., continued until November 1971, when the panel system was removed. Compilation and analysis of collected data were begun, as was planning for the next test. Preliminary analysis indicated that the structure influenced the shoreline for a distance equal to about three times the groin length. Obtention and processing of the program of data collection will continue at this site.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 15.0016, COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS

J.A. PURPURA, Univ. of Florida, School of Engineering, Gainesville, Florida 32601

The proposed program represents a long-range investigation to define the causes of and solutions to Florida's shoreline and beach erosion problems. The primary objectives of the study are described in the following paragraphs.

Inlets. - The role of inlets in contributing to the overall shoreline problems will be investigated. Special consideration will be given to the hydrographic features and sand bypassing processes at the various inlets.

Nearshore Sand Resources. - A sub-bottom profile will be used to define near-shore sand resources suitable for beach nourishment purposes.

Susceptibility of General Coastline to Wave Attack. - Wave refraction techniques will be employed to identify areas that are particularly vulnerable to storms originating from various directions. Erosion-deposition occurrences for particular storms will be correlated with these results.

Coastal Construction. - The performances and effects of various types of coastal structures and practices will be assembled and interpreted in order to document the most effective solutions to Florida's coastal problems.

Setback Line. - To make the necessary technical investigations in order to recommend setback lines defining the seaward limit of coastal construction throughout the various coastal counties of Florida.

SUPPORTED BY Florida State Government - Tallahassee

**15.0017, A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA**

*C. EMILIANI, Univ. of Miami, School of Marine Science, Miami, Florida 33149*

**Objective:** The objective is to investigate the interacting influences of the hydrodynamic environment and the sediment-biotic surface on sediment transport and bottom stability in the severely eroding Key Biscayne-Virginia Key Beach and littoral drift zone. This study will combine a general survey of sedimentation, depositional history, and water movement with a detailed examination of vegetative stabilization of the nearshore bottom. The following program is planned for the period November to June, 1972: 1) Determination of past shoreline changes using existing aerial photography and maps. 2) Diving observations and collection of sediment and bottom vegetative samples along sixteen beach-offshore profiles (laboratory analysis of samples). 3) Staking and monitoring erosion-accretion along eight beaches to offshore profiles. 4) Probing and coring in the littoral drift zone to determine character of underlying substrate and recent geologic history. 5) Determination of the wave characteristics in the study area by daily (visual) observations and limited measurements of current intensities and patterns. 6) Procurement, adaptation and in situ testing of an electromagnetic or acoustical bottom current meter.

**How information will be applied:** The overall results of this project will provide the following management guidelines: 1) How much shoreline protection, bottom stabilization and retardation of sediment loss does a vegetated bottom offer as contrasted with a free sand bottom? 2) What effect would destruction of a certain area of vegetated bottom (by dredging, pollution outwash, sediment starvation erosion) have on the adjacent beach shoreline? 3) What rates of nourishment are necessary to stabilize beaches? What sediment sources should be used? What should be nourished (beach, vegetated bottom)? The results of the first phase of this project will serve as background guidance for the subsequent more detailed phases of the program and will be used to give broader application of these detailed investigations to the area of study.

For additional information pertaining to this project contact Dr. Richard G. Bader, Director, Sea Grant Programs, University of Miami, Coral Gables, Florida 33146.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.A.A.

**15.0018, DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS**

*P. FAN, Univ. of Hawaii, Water Resources Research Ctr., Honolulu, Hawaii 96822*

The main purpose of this study is to determine the erosional rate of watersheds and depositional rate of estuarine sediments, and the pollution effect of estuarine environment by sediment load carried by surface waters. The research plan involves field and laboratory investigation of the watershed and estuarine sediments of Hawaii. Special effort will be concentrated at Waialeale watershed and Pearl Harbor estuary, Hawaii Kai and Maunaloa Bay of Oahu.

**SUPPORTED BY** U.S. Dept. of Interior - O. Wtr. Res. Reh.

**15.0019, NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT**

*UNKNOWN, U.S. Army, North Central Division, Chicago, Ill.*

land, water, and land beneath the water in close proximity to the Great Lakes shoreline. They represent a unique resource, rich in aesthetic and ecological values, scenic attractiveness, many beaches and access to lakes. These areas provide outstanding recreational opportunities. Great Lakes shorelands are subject to unique problems of flooding and erosion when subject to unusually high lake levels and storms. The information presented in this report is limited to the U.S. mainline shores of the five Great Lakes. The connecting rivers are excluded. Data on shores of the Great Lakes are limited and treated separately.

Pub. Aug. 71: 234p., NTIS No. AD-733 470: PC \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

**15.0020, LAKE SHORE EROSION IN ILLINOIS**

*W.J. ROBERTS, State Water Survey, Urbana, Illinois*

An investigation is being made of shore erosion caused by natural and recreational use. The relationship of beach erosion to horsepower, and exposure to headland erosion will be studied. Various protective devices will be suggested and their effectiveness studied.

**SUPPORTED BY** Illinois State Government - Springfield

**15.0021, NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION**

*UNKNOWN, U.S. Army, Engineer District, New Orleans, Louisiana 70160*

**Abstract:** The report is one of the nine regional inventories which are a part of the study and appraisal of the national shoreline authorized by Section 106 of Public Law 483, approved 13 August 1968. It is a compilation of available information on the gulf coast, including bays and rivers, of the State of Louisiana. Included in this regional inventory report is very general information on the characteristics, nature and extent of erosion, identified problem areas and possible remedial action, ownership, present and future use of the shore.

Pub. Jul. 71: 103p., NTIS No. AD-728 510: PC \$0.95.

**SUPPORTED BY** U.S. Dept. of Defense - Army

**15.0022, OFFSET COASTAL INLETS - FORMS OF SEDIMENT ACCUMULATION IN THE BEACH ZONE - ALASKA, NEW ENGLAND**

*M.O. HAYES, Univ. of Massachusetts, Coastal Research Center, Amherst, Massachusetts 01002*

**Abstract:** Offset coastal inlets are common on the New England and the northern Gulf of Alaska. In both areas the dominant waves approach the shore at an oblique angle, resulting in a strong net littoral drift. The most common form of offset on these coasts is a downdrift offset (the downdrift side of the inlet protrudes further seaward than the updrift side). Wave refraction around the ebb-tide inlets is an important process in the formation of downdrift offsets, inasmuch as it creates a local downdrift direction just downdrift of the inlet, and allows sediments to accumulate there. Forms of sediment accumulation in the beach zone include ridge- and runnel systems, berms, multiplicity of nearshore bars, cusp-type sand waves (or sandbanks), complex sand bodies affiliated with downdrifts, and an ordered system of minor features.

C.A. KAYE, U.S. Dept. of the Interior, Geological Survey,  
Boston, Massachusetts 02203

States to which project pertains: Massachusetts.

The project has studied the erosion of sea cliffs on Martha's Vineyard, particularly Gay Head. The many factors controlling the erosion necessitated an understanding of the geology of the cliffs. This work was extended and in consequence the geology of the island was studied in detail. Field studies are essentially completed. Report writing is the next phase. Vertebrate, invertebrate, and plant fossils collected from the cliffs are being studied by specialists, and it is hoped that final report will include chapters on the paleontology and pre-Pleistocene and Pleistocene geology as well as coastal erosion.

In addition, the project has studied erosion of sea cliffs in Boston Harbor and intertidal rock erosion at Nahant, Massachusetts. Fieldwork is completed except for the making of a detailed plane-table map of the Nahant area.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 15.0024, SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN

R.A. DAVIS, Williams College, Graduate School, Williamstown, Massachusetts 01267

Abstract: A mathematical simulation model is used to study the relations among storm cycles, beach erosion, and nearshore bar migration. The model is based on Fourier analysis of weather and wave data collected on Lake Michigan during the summers of 1969 and 1970. In the simulation of coastal processes, barometric pressure is used as the independent variable with longshore current velocity computed as the first derivative and breaker height as a filtered version of the second derivative of barometric pressure. The simulated curves are used to compute wave and longshore current energy for each storm cycle and poststorm recovery.

Pub. Nov. 72: 23p., NTIS No. AD-765 888/3: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 15.0025, PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN

W.T. FOX, Williams College, Graduate School, Williamstown, Massachusetts 01267

Abstract: A large low pressure system that passed through Lake Michigan during late July 1969, provided opportunity for detailed analysis of storm effects on beach and nearshore processes. During the passage of this storm, observations on 17 environmental parameters were being recorded at 2 hour intervals. These data were subjected to Fourier analysis and plotted in a time series by computer. Such analysis shows that there is a definite relationship between barometric pressure, breaker height, breaker angle and longshore current velocity. These are among the significant factors in beach erosion. As the storm passed, the beach and adjacent cliff underwent extensive erosion. The post-storm profile showed a nearshore sand bar which was derived from the beach area during the storm. During succeeding days, this bar began a shoreward migration and was eventually incorporated with the beach.

Pub. 1970: 9p., NTIS No. AD-723 932: Reprint.

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 15.0026, COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES

ment and planning techniques and concepts for Lakes which will help to enhance man's use of the areas while preserving a unique and valuable natural system.

How information will be applied: Results of research incorporated in a regional plan being prepared by the City Regional Planning Commission. They will be used by all of the Communities of Grand Traverse Bay. Shorelands Coordinating Committee to solve bay-lands problems and better meet future objectives. Also be presented to the Michigan Water Resources Commission for inclusion in their state-wide shorelands plan and will be further developed and refined throughout the Great Lakes for developing a coastal zone management approach.

Accomplishments during the past twelve months: Provided information to U.S. Corps of Engineers on shoreland management; produced critique of Hawaii's coastal zone; advised local citizens concerning Soil Conservation erosion project; drafted joint publication with Resources Commission; published Traverse Bay Progress Report; helped establish Traverse Bay Coordinating Committee; contributed sections to Bay Regional Planning Commission regional planning conference on shorelands management; advised Bay citizens on marsh preservation; developed comprehensive coastal zone computer system concept; shorelands design concepts and impact matrices; coastal zone library

For additional information pertaining to this project: John M. Armstrong, Director, Sea Grant Program of Michigan, Ann Arbor, Michigan 48104.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.

#### 15.0027, ENVIRONMENTAL GEOMORPHIC STUDIES OF THE COASTAL REGIMES ALONG THE SOUTH SHORE OF LONG ISLAND - NEW YORK

D.R. COATES, State University of New York, School of Marine and Coastal Sciences, Binghamton, New York 13901

Objectives: The objectives of this project are to evaluate and measure those geomorphic processes that affect the coastal zone and depositional sedimentation regimes of the beach and dune system on the South Shore of Long Island.

How information will be applied: Despite enormous expenditures by Federal and State agencies on erosion control on the South Shore of Long Island, there has been little attention given to providing information of use to local management and to the development of alternative procedures to those of Federal orthodoxy. Among the agencies seeking information from this project are: Fire Island Seneshore Commission, Nassau-Suffolk County Planning Board, the New York State Park Commission, and local town governments. Citizens conservation and environmental groups also seek the information. Through close cooperation with these groups and through the Sea Grant Advisory Program an educational program will be established above agencies and among the citizens as a group.

Accomplishments during the past twelve months: 1. A dune stabilization problem on Fire Island. 2. Determination of man-made alterations on bay side of Fire Island such as boat slips, marinas, dredging. 3. Evaluation of causes that contribute to abnormal accelerated erosion of certain parts of Fire Island. 4. Studied factors that control limits for utilization of Fire Island region.

resource. 5. Measured quantitative shoreline changes of Fire Island for the period 1962-1972. 6. Initiated a program for wave hindcasting of the South Shore. 7. Identified areas of potential washovers or breakthroughs on Fire Island. 8. Initiated a study of the relationship of dune height and profile to shore recession.

For additional information pertaining to this project contact Dr. Donald F. Squires, Director, New York State Sea Grant Program, State University of New York, Albany, New York 12210.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 15.0028, GROIN STUDY ON THE NORTH SHORE OF SUFFOLK COUNTY, LONG ISLAND, NEW YORK, BETWEEN ORIENT POINT AND PORT JEFFERSON HARBOR

*T. OMHOLT*, New York Ocean Science Lab., Montauk, New York 11954

Approximately fifty small groins located on the north shore of Suffolk County will be evaluated for their effectiveness in trapping sand and their effects on adjacent beaches. Changes in the shoreline will be investigated by the use of existing maps, charts and aerial photographs, beach surveying and wave refraction techniques.

SUPPORTED BY New York Ocean Sci. Lab. - Montauk, N.Y.

# 15.0029, EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST

*R.L. INGRAM*, Univ. of North Carolina, School of Arts, Chapel Hill, North Carolina 27514

The objectives of this project are: (1) to determine the changes that are taking place in the bottom topography and shorelines of selected study areas typical of the total sound-estuary environment of the North Carolina coast, but especially Pamlico Sound, (2) to study the erosional and depositional processes responsible for these changes; and (3) to predict future changes.

How information will be applied: Information gained in this program will be used by State and Federal agencies to predict the effects on erosion and deposition of (1) storms; (2) changes in river regime from floods, droughts, dams; (3) soil conservation practices; (4) opening and closing of inlets; (5) dredging activities; (6) construction of shoreline facilities; (7) shoreline and bottom mining.

Accomplishments during the past twelve months: old and new aerial photographs of the study areas have been obtained and are being studied. Detailed Fathometer tracings are being made. The heavy mineral content of 173 samples has been used to estimate the source of the sands being deposited in the sounds and estuaries. The clay mineral content of 80 samples has been used to estimate the source of the clays being deposited in the sounds and estuaries. Box cores are being taken in the study areas.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

# 15.0030, SHORE EROSION STUDY OF ERIE COUNTY, OHIO

*L.L. BRAIDECH*, State Div. of Geolog. Survey, Columbus, Ohio 43212

The objective of this project is to obtain data for an up-to-date appraisal of the geology of the shoreline and nearshore bottom, including the contemporary geologic and limnologic

Field work will include: reestablishment of a horizontal vertical control system, preparation of map showing location of the present shoreline and land features; graphic survey of the study area, collection and analysis of bluff, beach, and nearshore bottom material, borings, probings to bedrock, study of wind and weather patterns, study of variations in lake level, measurement of currents, a study of ice conditions, investigation of hydrography, comparison of repetitive aerial photographs, determination of rates of shore erosion and bluff recession, study of dune formation and movement, littoral processes, and existing structures.

SUPPORTED BY Ohio State Government - Columbus

# 15.0031, SHORE EROSION STUDY OF LAKE ERIE, OHIO

*L.L. BRAIDECH*, State Div. of Geolog. Survey, Columbus, Ohio 43212

The objective of this project is to collect data for a study of the geology of the shoreline and nearshore for that portion of Lake Erie located within the boundaries of Lake County. A study and mapping of the shoreline of Lake County. A study and mapping of the shoreline along the shoreline will extend landward far enough to that portion of the land mass most directly affected by problems of shore erosion. This distance may vary from area to area but will not extend further landward than the unaffected roadway paralleling the shoreline.

This area undergoes the most severe annual erosion and will therefore receive the primary focus of attention in an over-all erosion control study for the entire shoreline of Lake Erie. Field work will include: the measurement and sampling of sections of the bluff and slopes, run profiles and sampling for mechanical and mineral analysis, boring and probing to bedrock, study of current surveys, determination of volumes of bottom material transport by use of sediment collector platforms, determination of erosion losses by use of aerial photography.

Baseline control and shore point locations established by the Beach Erosion Control Board, U.S. Corps of Engineers will be utilized for this study.

SUPPORTED BY Ohio State Government - Columbus

# 15.0032, SHORE EROSION STUDIES ALONG THE SHORE OF LAKE ERIE

*C.H. CARTER*, State Div. of Geolog. Survey, Sandusky, Ohio 44870

Our studies will document the what, where, how, and rates of shore erosion along the Ohio shore of Lake Erie. We are particularly interested in looking at the effects of man-made structures on the shore processes.

Aside from basic mapping techniques we have established points to measure erosion and/or accretion rates from the shore to 2000 feet offshore. Aerial photography since as early as 1930 has enabled us to observe changes in the shoreline zone within a precise chronologic framework.

We hope to have five counties (Lake, Erie, Sandusky, Seneca, and Lucas) completed by the spring of 1974 and the remaining three counties (Ashtabula, Cuyahoga, and Geauga) completed by late 1974.

SUPPORTED BY Ohio State Government - Columbus

# 15.0033, EVALUATION OF GEOLOGIC AND

for the configuration of the coast. The inaccessible parts of the coastline (about 14%) will be examined from the air.

Refraction diagrams for different wave conditions will be prepared in order to evaluate the distribution of wave energy along selected portions of the coast.

The relative importance of the geologic and oceanographic factors will be determined, areas particularly prone to erosion delineated, and the results of the evaluation made public and submitted to the Advisory Committee to the State Land Board.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Res.

#### 15.0034, EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS

R.L. FREDRIKSEN, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta., Portland, Oregon 97208

Abstract: In two steep headwater drainages, landslides were the predominant source of increased sedimentation of streams following timber harvest. Patch-cut logging with forest roads increased sedimentation compared with a control by more than 100 times over a 9-year period. Landslide erosion was greatest where roads crossed high gradient stream channels. In an adjacent clearcut watershed with no roads, sedimentation increased three times that of the control.

Pub. 1970: 19p., NTIS No. PB-194 987: MF \$0.65.

SUPPORTED BY U.S. Dept. of Agriculture

#### 15.0035, PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET

C. MASON, Texas A & M University System, Graduate School, College Station, Texas 77843

Abstract: An environmental study was conducted at Brown Cedar Cut, a natural unstable barrier beach inlet connecting East Matagorda Bay, Tex., with the Gulf of Mexico. The objectives of this study were to determine the physical and hydraulic properties of the inlet, and to investigate the inlet's historical stability, as well as its short-term response to a number of physical processes. Results of the study indicate that hurricanes and continuing erosion of adjacent beaches enhance the long-term stability of the inlet. During winter months, the rapid passage of strong frontal systems and associated winds, as well as substantial amounts of rainfall, are primarily responsible for the day-to-day viability of the channel boundaries. In the absence of such forces, the predominance of littoral drift over the limited flushing ability of astronomical tidal currents leads to degradation of the inlet channel and westward migration of the entire inlet system.

Pub. Aug 71: 175p., NTIS No. COM-71-01019: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Science Foundation

#### 15.0036, INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS

W.N. SEELIG, Texas A & M University System, Graduate School, College Station, Texas 77843

Abstract: An environmental study was conducted at Sargent Beach, Texas, an erosive beach bordering the Gulf of Mex-

ate since at least 1930 with recent shoreline retreat averaging 30 feet per year. Storms are the primary cause that remove material from the beach, while lost sands are not replaced because Brazos River sands normally expected to move alongshore are trapped in the Brazos. Hurricanes may free stored deltaic sands carrying quantities offshore from beach areas. Beach erosion is aggravated by decreased sand input to the coast by the Brazos River due to alterations to the river and its basin in the 1940's.

Pub. Sep. 73: 162p., NTIS No. COM-74-10157/1: PC \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.

#### 15.0037, TEXAS BARRIER ISLANDS

R.E. HUNTER, U.S. Dept. of the Interior, Geological Survey, Corpus Christi, Texas 78411

States to which project pertains: Texas.

The project is a topical study of coastal sediments and sedimentary processes on and adjacent to the barrier islands of the Texas Gulf Coast. The ultimate objectives are: (1) to determine the conditions and processes responsible for the growth, and maintenance of barrier islands, (2) to determine why and where excessive coastal erosion and sedimentation occur, and (3) to develop criteria for the recognition of barrier islands and nearshore deposits in ancient sedimentary rocks. These goals will be pursued through the interrelated objectives of defining the kinds and rates of sedimentary processes and the character of the resultant depositional landforms.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 15.0038, ENVIRONMENTAL GEOLOGY OF SEVERAL PARTS OF NORTHWESTERN VERMONT

W.P. WAGNER, Univ. of Vermont, State Resource Center, Burlington, Vermont 05401

The objectives of the proposed project are: (1) to evaluate the water supply potential of the Champlain Valley, by mapping aquifers, water table elevations, recharge and aquifer capacities; (2) to locate and evaluate suitable sites for garbage dumps in the Champlain Valley; (3) to evaluate the septic waste disposal potentials of selected upland areas; (4) to map the distributions and evaluating the character of unconsolidated materials; (5) to evaluate the magnitude, and extent (rates) of stream bank and bed erosion.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Res.

#### 15.0039, SEDIMENT MOVEMENT AND HILLSIDE MORPHOLOGY IN THE CENTRAL APPALACHIAN MOUNTAINS - VIRGINIA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Arlington, Virginia 22209

Sediment, particularly in connection with major rainfall events, causes many deaths and millions of dollars damage annually. The destruction results from sedimentation, its movement down hillsides and along stream channels, and its deposition. The prediction of important sedimentation events and the prevention or reduction of damage is not possible until systematic, planned sedimentation and geomorphic studies are made.

To derive a basis for predicting the occurrence and nature of major sediment movements on hillslopes and in channels in the Central Appalachians and nearby areas, in order to prevent or reduce the customary widespread damage that occurs to man and his property from such movements.

Document and examine the geomorphic and sedimentologic features of catastrophic sediment movements such as those which resulted in central Virginia from the rains of hurricane Camille in 1969. Measure and evaluate the extent and location of erosion, the amount and location of deposition, sizes of sediment particles involved, geomorphic characteristics of affected and unaffected hillslopes and valleys, and any other features which may aid in attaining the research objective.

Obtained further field data on channel geometry and bed-material samples. Continued analyzing data on channel geometry. Wrote further portions of first draft of manuscript on same. Results to date show some promise of establishing a relationship between flow characteristics at a station and certain measurable features of the channel, such as shape of cross-section and sizes of bed material.

Complete the analysis of the data on hand; obtain additional data as the need arises; draw conclusions; finish writing first draft of manuscript.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

## 16. MULTIPLE HAZARDS

### INDIVIDUAL ASSISTANCE

#### 16.0001, EMERGENCY OPERATIONS SYSTEMS DEVELOPMENT - CIVIL DEFENSE RESCUE PHASE II

L.C. THOMAS, Stanford Research Institute, Menlo Park, California 94025

Abstract: The major purpose of the Phase II rescue task was to redefine the rescue function in terms of a broad lifesaving role so that the bases for guidance materials for local governments would be fully supported by these findings. The report deals with the attack environment, base for rescue, operations, supporting services, program elements, and rescue force acquisition.

Pub. Nov. 67: 111p., NTIS No. AD-776 350/1: PC \$8.75 MF \$1.45.

SUPPORTED BY No Formal Support Reported

#### 16.0002, CONSULTATIVE PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN RAPID CITY, SOUTH DAKOTA

C.L. KEENER, Unknown Inst. or Indiv. Grant, Colorado (HSM-42-73-58)

The Contractor shall furnish all necessary services and materials to provide consultative psychiatric services to individuals, community groups and agencies in the Rapid City, South Dakota area regarding disaster related mental health problems. Specifically, the Contractor shall: 1. Provide consultation in symptoms of disaster related mental health problems and ways to handle them. 2. Provide individual care consultation with mental health workers and physicians. 3. Provide consultation with community agency and group members as to handling their own feelings and reactions as a result of working with flood victims. 4. Assist in the develop-

residents of possible emotional reactions and ways to cope with them. 6. Provide residents an opportunity to express their concern and reactions or possible reactions to the disaster.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

#### 16.0003, DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION

UNKNOWN, Dunlap & Associates Inc., Darien, Connecticut 06821 (045526)(TRAIS)

A training program for Emergency Medical Services (EMS) will be developed to fulfill the requirements of Highway Safety Program Standard No. 11 with respect to program administration of state and local emergency medical services. A detailed project schedule will be developed, as well as a complete knowledge, skill, and behavioral specification for EMS program administration, including the terminal, instrumental, and associated performance requirements. The training objectives will be determined, and curriculum content and methodology developed. The curriculum will be organized to reflect the logic and sequence of the training program.

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation - N.H.T.S.A.

#### 16.0004, PROBING THE LAW AND BEYOND - A QUEST FOR PUBLIC PROTECTION FROM HAZARDOUS PRODUCT CATASTROPHES

J.M. BROWN, George Washington University, Prog. of Pol. Stud. Sci. Tech., Washington, District of Columbia 20037

Abstract: Contents: Progress and the calculated risk; The legal process as a response mechanism; Interaction of the legal process with institutional response mechanisms; Institutional mechanisms responsive to disaster; The Ohio State University Disaster Research Center; Identification of representative elements of a tolerable risk; Phase- lines of community involvement in disaster situations; Recent Federal Government hazard-related activities.

Pub. Jul. 69: 62p., NTIS No. PB-192 558; HC \$3.00 MF \$0.65.

SUPPORTED BY No Formal Support Reported

#### 16.0005, THE FEDERAL RESPONSE TO TROPICAL STORM AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF

UNKNOWN, U.S. Exec. Office of the Pres., Off. of Emergency Preparedness, Washington, District of Columbia 20006

This report covers the activities of the Office of Emergency Preparedness and other Federal agencies in the seven States that were declared major disaster areas as a result of Hurricane Agnes and the ensuing tropical storm. By bringing together in one report the activities of several agencies, the report highlights the coordination that was achieved among local, State, Federal, and voluntary agencies in restoring community services and aiding individuals to recover from the effects of this disaster.

Pub. May 73: 62p., Fed. Disaster Assist. Admin., Dept. of HUD, Wash., D.C.

Abstract provided by FDAA.



The objective of this project is to develop an emergency medical system (EMS) simulation model to be used in the planning of emergency medical services. The model is to be able to evaluate the effects on emergency medical services of changes in the following EMS factors: communications, emergency dispatching procedures, emergency vehicle routes; the number, location, and types of emergency facilities; treatment at the scene, enroute, and within the emergency facilities; number, types, and location of emergency vehicles; emergency vehicles equipment; and training of emergency vehicle attendants.

The planning model is to have the capability to evaluate changes in the EMS factors in terms of appropriate measures of effectiveness such as emergency system response time, emergency victims mortality rates, and the percentage utilization of emergency system components. Also, the incidence of long delays before the arrival of an emergency vehicle is to be incorporated in the model as a measure of effectiveness. The EMS planning model may be used by health planners who must determine how best to change an emergency medical system to respond to the expanding demands for emergency services or to improve the performance of an emergency medical system.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

#### 16.0007, MILITARY BLOOD BANKING (CIVIL DISASTERS)

F.R. CAMP, U.S. Army, Medical Research Laboratory, Fort Knox, Kentucky

Abstract: The article presents factors that feature predominantly in providing safe blood therapy in a civil disaster situation. Equally important are the special problems existing today which are discussed because they can cause injury to the recipient of blood transfusion. The Blood Transfusion Officer must make the decision to shift from business-as-usual to an emergency set of procedures. The sorting team chief should be in a position to know the number of casualties the hospital can accommodate and this information should be available to the professional staff and blood bank. This variable is influenced by the size of the medical installation. Even with training and experience, these are difficult decisions. Practice runs in all areas responsible for handling mass casualties are strongly recommended for the blood bank and hospital staff.

Pub. May 71: 15p., NTIS No. AD-726 341: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0008, BODY RECOVERY DOG

W.L. QUINN, U.S. Army, Land Warfare Laboratory, Aberdeen Proving Ground, Maryland 21005

Abstract: A four-month study that demonstrated the feasibility of training dogs to search for and locate human casualties under conditions that might exist in the aftermath of man-made or natural disasters was conducted as a joint project by the U.S. Army Land Warfare Laboratory and the U.S. Army Infantry School. Four body recovery teams, each consisting of a dog and its handler, were trained to search in mud, water, rubble of demolished buildings, wrecked vehicles, and in sanitary fills and dumps for simulated human casualties. The teams are available for employment by civilian as well as by military authorities in the event of a disaster.

Pub. May 73: 49p., NTIS No. AD-763 219: PC \$3.00 MF \$0.95.

Solve the acute problem facing Search and Rescue (SAR) agencies in minimizing the time interval between the occurrence of a mishap and the initiation of rescue efforts.

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation - Coast Guard

#### 16.0010, SEARCH AND RESCUE COMMUNICATION- GLOBAL RESCUE ALARM NET (GRAN)

W.R. CRAWFORD, U.S. Navy, Air Test Center, Patuxent River, Maryland 20670

Determine the feasibility of using satellites to receive and relay low power distress signals to provide world-wide search and rescue capability.

Conduct tests utilizing low power radios (250-600 mw) to access present satellites. Determine ability of satellites to receive and translate the low power signal. Omega retransmission techniques being developed to provide precise localization of personnel in distress. Omega signals analyzed at monitoring ground station.

Supporting agency address information: Naval Air Systems Command AIR 340F, Washington, D.C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

#### 16.0011, PUBLIC HEALTH SERVICE DISASTER ASSISTANCE REPORT JULY 1967-JUNE 1970

UNKNOWN, U.S. Dept. of Hlth. Ed. & Wel., P.H.S. Hlth. Serv. & M.H. Adm., Rockville, Maryland 20852

This report covers assistance provided by the U.S. Public Health Service (PHS) during 79 disasters that occurred in the United States from July 1, 1967 through June 30, 1970. It is a consolidated report based on daily statements that were issued from Department of Health, Education, and Welfare Regional Offices by Emergency Health Services Program Directors who are responsible for coordinating all PHS disaster activities. It is possible that some disaster assistance and relief activities were not reported to the PHS coordinating offices and therefore not sent to headquarters in Washington, D.C. Thus, they would not appear in this report. Also included is material that outlines PHS assistance of States and several foreign countries during disease outbreaks, epidemics, and threatened epidemics.

In this report there were 26 disasters of sufficient magnitude that the President of the United States declared them major disasters, making the States in which they occurred eligible for financial and other assistance provided by the Federal Disaster Act (PL 875). This Act, administered by the President's Office of Emergency Preparedness (OEP), enables States and local governments to receive supplemental Federal assistance that includes money, medicines and other consumable supplies, protective and other services to help preserve life, and emergency repairs to damaged or destroyed public facilities.

Pub. April 1971: 54pp., Public Health Service Publication 1071-A-12, Emergency Health Series A-12.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

#### 16.0012, HELICOPTER AMBULANCE SERVICE TO EMERGENCIES

**Abstract:** The study concludes that helicopter ambulance service would be reasonable in the outlying areas of the state because: Ground ambulance service with adequately trained personnel is not readily available in the remote areas of the state; Medical facilities are not as numerous and do not have the capabilities of caring for the critically injured. This necessitates transferring the patient to a larger medical facility in a metropolitan area; Transfers of the critically injured from outlying hospitals to a metropolitan area via helicopter with its greater speed and smoother ride would be the greatest service a helicopter could offer.

Pub. Mar. 71: 161p., NTIS No. PB-200 308: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**16.0013, COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES**

J.E. CLARK, Mississippi St. University, School of Engineering, State College, Mississippi 39762

**Abstract:** Project CARE-SOM was a 15-month study of a total emergency medical service system. The concept of the total system which involved the application of new techniques and existing technology was developed by the authors who are engineers and researchers. Advice and the services of experts and personnel in the fields of law, medicine, communications, and law enforcement were obtained through an advisory committee. The system was operated by local people who were a part of the existing emergency medical services including physicians, hospital personnel, ambulance attendants, and law enforcement officers. The cooperation of these people was essential if meaningful results were to be obtained. The performance of the system was recorded through a data collection program and measured by the Project research staff at Mississippi State University. Certain aspects of the system were stimulated by a mathematical model using field data as input.

Pub. Sep. 70: 184p., NTIS No. PB-199 756: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

**16.0014, CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20)**

D.G. PENTERMAN, State Off. of the Adj. Gen., Lincoln, Nebraska

**Abstract:** The purpose of the demonstration project was to develop a flexible, comprehensive methodology for evaluating and improving emergency medical service systems on the highways of the State of Nebraska, and implement a total system concept which would demonstrate the maximum use of multidisciplinary subsystem for rapid and effective response to the urgent needs of highway sick and injured, and to establish an emergency notification, dispatch, and assistance program for highway accident victims. The research program consisted of eight elements for detailed study. They were: notifications, video tape documentation; ambulance attendant and training; one county road equipment test; computer assist information system; comparative analysis of air and ground ambulances; vital function telemetry; and

**16.0015, DEVELOPMENT OF A DISTRESS AND LOCATING SYSTEM (DALS) FOR SEA RESCUE MISSION**

UNKNOWN, Beukers Laboratories Inc., Smithtown, New York 11787 (025086)

**Development of a distress alerting and locating system for search and rescue mission. This system will combine an alpha-numeric identification and data readout capability into a Beukers Locate Mode Track and Position System. The alpha-numeric identification readout capability, i.e. CG-30.515, was developed by Electronics Beukers Laboratories will modify the track and position equipment to incorporate this system.**

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation -

**16.0016, ANALYSIS OF EMERGENCY MEDICAL SERVICES COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL SUBDIVISIONS**

R.C. CHASE, Ohio State University, School of Public Health, Columbus, Ohio 43212

**Information of the emergency medical service system throughout Franklin County during a four month study will be gathered to field test an existing HEW system model of emergency medical service. The results of the study will be used to develop recommendations and to evaluate the feasibility of developing a program which can be applied to other cities in Ohio.**

SUPPORTED BY Ohio State Government - Columbus

**16.0017, THE SALVATION ARMY - ITS STRUCTURE, OPERATIONS, AND PROBLEMS IN DISASTER RELIEF**

J.L. ROSS, Ohio State University, Disaster Research Center, Columbus, Ohio 43210

**Abstract:** The history and organizational structure of the Salvation Army are discussed with attention directed to the religious and social welfare orientations of the organization. The report focuses on disaster relief operations, the general conditions influencing the participation of the organization in contemporary major community emergencies in America. Included in the report is an illustration of operations the Salvation Army engages in, in the wake of a large-scale hurricane. The implications for Salvation Army operations in a nuclear environment are also presented.

Pub. Dec. 69: 68p., NTIS No. AD-709 676: HC \$0.65.

SUPPORTED BY No Formal Support Reported

**16.0018, SYSTEMS ANALYSIS OF EMERGENCY MEDICAL DELIVERY**

W.F. HAMILTON, Univ. of Pennsylvania, School of Public Health, Philadelphia, Pennsylvania 19104

**Planning for emergency services has typically been haphazard and inadequate. Emergency care in most communities depends upon a fragmented collection of transportation, communication, hospital, and physician services. Designing an emergency medical care system is assuming an increasingly important role in the delivery of personal health care. The emergency room has replaced the vanishing family physician in many areas and is now the principal site of general medical care for certain patient groups.**

operation research methods. Specific aims of the proposed research include the development, application, and evaluation of a simulation model of the emergency care system. Past descriptive studies and modeling efforts have generated a suitable data base for the proposed research.

The research plan is to: (1) conduct an extensive information search into previous descriptive and normative studies of emergency care systems; (2) to develop a realistic model of emergency medical care delivery and validate the model using available data with Philadelphia as the test site; (3) to use the model to analyze possible improvements in emergency care organization and delivery; (4) to evaluate and document the findings; and (5) to develop a long term research program for extending the methodology to planning for the delivery of other outpatient services.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A

#### 16.0019, RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID

UNKNOWN, Univ. of Pennsylvania, School of Commerce, Philadelphia, Pennsylvania 19104

A case for a system of disaster insurance to replace the current federally subsidized disaster relief policy. In the last twenty years, as the cost of repairing damage from natural disasters has come increasingly to be treated as a public responsibility, federal disaster aid has risen from \$52 million (fiscal 1953) to over \$2.5 billion (fiscal 1973). Professor Kunreuther shows that the current disaster relief program has failed to discourage individuals from locating in hazard-prone areas and may, in fact, reinforce their reluctance to insure themselves against potential losses.

How would the disaster victim and the federal government fare if an insurance program were to replace the present SBA disaster program? Professor Kunreuther provides a quantitative answer to this question through a detailed analysis of Small Business Administration disaster loan files covering the San Fernando Valley earthquake (1971), the Rapid City flood (1972) and Tropical Storm Agnes (1972). He finds that, on the average, disaster insurance is preferable to federal disaster relief from the point of view both of the homeowner and of the federal government.

Pub. Dec. 73: 71p., Eval. Studies 12 Dec. 73, ISBN0-8447-3122-6; Amer. Enterprise Inst. for Pub. Policy Res. Wash., D.C., PC \$3.00.

Abstract provided by FDAA.

SUPPORTED BY No Formal Support Reported

#### 16.0020, TRAINING PROGRAM FOR CRISIS INTERVENORS

UNKNOWN, Western Health Systems Inc., Rapid City, South Dakota 57701 (HSM-42-74-17(OD))

The Contractor shall, through its Committee of Mental Health, plan, develop and implement a Mental Health Training Program for Crisis Intervenor (also referred to as 'Natural Helpers' and 'Trainees') to deliver services to the people of the Sixth Planning and Development District of South Dakota affected by the flood of June 9, 1972 and to provide for an evaluation of the training and the trainee's practicum relevant to the delivery of mental health services.

The Contractor will search for, find and train within the community 'natural helpers' (crisis intervenors) who will reach out and identify those with mental health problems, discover causes, and find solutions to problems. The contractor will

and improvement of the troubled individual's environment, the organization of groups (or use of existing groups) with community problem areas that contribute to stresses. The 'natural helpers' (crisis intervenors) will provide treatment for those clients with emotional problems but will be trained in their detection and refer to appropriate professional mental health specialists for treatment.

The training program will train and assist the trainees in the implementation of the 'Searchlight' model in their work setting. The professional trainees will be assisted by FUND in developing concepts and descriptions, b) reflections, c) natural management of neighborhoods, neighboring patterns and routines, identification of additional staff and e) concepts of trainee relationships and the relationship of the trainees to the community.

In-service training will be provided by Lutheran Social Service Staff throughout the year of the Project to train the trainee's skills in communication. The training will be provided in group sessions with one or two trainers to cover listening, problem solving and small group organization.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - A.D.M.H.A

#### 16.0021, MANAGEMENT OF INSURABLE RISK

M.B. BADENHOP, Univ. of Tennessee, Agricultural Experiment Sta., Knoxville, Tennessee 37916 (TEN0027)

Objective: Determine the extent and effectiveness of crop insurance; determine the extent of values owned by Tennessee farmers, the insurable risk; determine these values are exposed, and the risk management strategies employed; and appraise risk management programs employed with reference to values exposed, the insurance coverage, their cost and indemnities paid.

Approach: Data from records available with the State Crop Insurance Corporation will be used to select counties with homogenous risk in crop production. Randomly selected counties will then be selected and a random sample of farmers drawn from each county and interviewed for information on crop insurance programs. These interviews will also supply data on capital values owned, insurable risk management strategies employed. Indicators of risk management within developed risk classification systems established with reference to values exposed to risk, insurance coverage, effectiveness of risk strategies, and loss probabilities. Model risk management systems will be constructed and resolved through linear programming and minimization procedures. Comparisons will be made between different types of insurance. Guidelines to assist farmers in making sound risk management decisions will be prepared.

Progress: One hundred sixty East Tennessee farmers were interviewed for information on risk circumstances and insurance coverage used to protect values at risk. From these data, an overall insurance management effectiveness was determined. The quantitative variables used were the value of insurance coverages, and financial reserves. Insurance payments averaged \$257 per farmer in 1969 to cover values at risk—mostly their physical assets which averaged \$22,000 per farmer. These farmers, however, allocated 15% of their insurance budget to protect their values, about 30% of their replacement value. Other budget allocations were: 8% to cover possible loss from the tobacco crop; 24% for automobile insurance; 14% for hospitalization insurance; 14% for life insurance.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

SUPPORTED BY Texas A. &amp; M. University System

**16.0022, EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES****H. PLAAS**, Univ. of Tennessee, School of Liberal Arts, Knoxville, Tennessee 37916

The purpose of this study is to review the research in Municipal Emergency Health Care Services (EHCS) and to systematically evaluate the usefulness of the research for municipal policy making.

Currently EHCS is once again being recognized as a vital part of the health care system. In the process, traditional concepts of organization and administration are being challenged as inappropriate for the conditions now current in urban and rural America. Municipal governments and urban communities are particularly being challenged to reconsider their place in the provision of emergency health care services.

The purposes of this study are: (1) to assemble and classify research in EHCS; (2) to propose a conceptual framework for EHCS which will be useful for doing the following: a) evaluate the validity of various pieces of research from the perspective of the adequacy of research design and methodology; b) to evaluate the contribution of the research to total systems gains and to evaluate its credibility in the light of other studies; and c) to determine the policy relevance of the research, including impact on patient recovery, system acceptable costs and to test the policy utilization resulting from the studies.

SUPPORTED BY U.S. Natl. Science Foundation

**16.0023, DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION****C.E. GOSHEN**, Urban Obs. of Met. Nashville, Nashville, Tennessee

**Abstract:** The need is shown for coordination and integration of existing health-care facilities to increase efficiency and allow geographical expansion of emergency medical services. The proposed design describes both available and needed software (system design charts, personnel) and hardware (air and ground vehicles, data and communication systems) in three major areas: hospital-medical services, communication-information, and ambulance/on-site services. Links are needed with other agencies (police, fire) for coordination and supplemental information (e.g. traffic, road and weather status). The recommended plan has been implemented and is now operational in middle Tennessee.

Pub. Jun. 70: 20p., NTIS No. PB-230 959/9- PC \$4.00 MF \$1.45.

SUPPORTED BY U.S. Dept. of Housing &amp; Urban Development

**16.0024, THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL CARE SYSTEMS****D.P. SKOGMAN**, Texas A & M University System, School of Engineering, College Station, Texas 77843

**Abstract:** The major purpose of this paper is to contribute toward improved emergency medical care. The results of helicopter performance in civilian air rescue operations are presented. Suggestions as to the future role of helicopters within the emergency medical system are discussed. The other

**PUBLIC ASSISTANCE****16.0025, URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)****UNKNOWN**, State Div. of Mines & Geology, Sacramento, California 95814

The results of a three-year study of geologic problems in California are presented. The total projected loss attributable to property damage, life loss and loss of mineral resources, including both direct and indirect costs, caused by ten geologic problems in California from 1970 to 2000 is estimated to be \$55 billion. Four problems- earthquake shaking, loss of mineral resources, landsliding, and flooding- account for 98 percent of the total projected loss. The remaining 2 percent of the estimated loss is due to erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence.

The state of the art relative to measures to reduce losses caused by the ten geologic problems is reviewed and benefit:cost ratios are presented for each problem. An estimated \$38 billion of the \$55 billion total projected loss could be prevented by application of current state-of-the-art loss-reduction measures. The total cost of applying these measures is estimated at \$6 billion, for an overall benefit: cost ratio of 6.2:1. In addition, then, to satisfying the needs for increased public safety and the social and political concerns therefor, geologic hazards loss-reduction is also 'good business.'

The degree of effectiveness of the various types of loss-reduction measures possible are reviewed and recommendations are presented. The most effective action that can be taken is for cities and counties to strengthen and diligently enforce existing grading ordinances and building codes.

A methodology for setting priorities for the application of loss-reduction measures is presented. The study concludes that no single ranking of priorities with respect to localities, specific problems, or particular loss-reduction programs, is feasible; but the actions taken should commence in the more populated and the more hazardous areas.

Pub. 73: 112p., No copy info available.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing &amp; Urban Development

**16.0026, DEBRIS CLEARING TIMES AFFECTING CRITICAL SURVIVAL ACTIONS****T.N. WILLIAMSON**, Jacobs Associates, San Francisco, California 94111

**Abstract:** Clearing of emergency rescue routes through street debris would be a most urgent operation following a nuclear attack or other massive debris-causing event. Paths at least wide enough to pass ambulances, rescue vehicles and fire trucks will be required where there may be survivors or facilities which must be protected for survivors. This study analyzes the debris potential in 24 residential situations ranging from single family units to multi-story apartments, all subject to 2.4,6 and 10 psi overpressures. The effectiveness of the debris clearing operation is estimated. The other

Pub. Aug. 73. 152p., NTIS No. AD-700 5073. PC \$4.75 MF \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0027, IMPROVISING ELECTRIC POWER FROM INDUCTION GENERATORS DURING PROLONGED POWER OUTAGES

R.H. BLACK, U R S Systems Corporation, San Mateo, California 94402

Abstract: The objective of the work is to: Determine the feasibility of using large induction motors as induction generators; Work out the problems attendant with using engine generators and induction generators as improved or temporary sources of electric power during prolonged power outages; Prepare the manuscript for a guidance and procedures manual for utilizing emergency power sources.

Pub. Sep. 71. 75p., NTIS No. AD-741 386. PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0028, ASSESSMENT OF RESEARCH ON NATURAL HAZARDS

J.E. HAAS, Univ. of Colorado, School of Arts, Boulder, Colorado 80304

This supplements NSF award (GI-32942). The principal objectives of the basic award are to: 1) develop standard criteria for the production of social and economic cost data on major natural hazards and to determine the population at risk; 2) assess for the nation, its regions and states the present and prospective economic and social cost from major natural hazards and alternative feasible ways of reducing these; 3) to prepare a program statement of needed research and the expected payoffs, and 4) to involve academic and user communities throughout the research process.

All of the items in the supplemental budget are consistent with the above objectives. The supplemental budget will enable the project staff to develop much more adequate utilization plans through a more generous publication budget and the conduct of a major conference at Estes Park, October 15-19, 1973. The supplement also makes provisions for the continued use of its active and concerned Advisory Committee. The supplement requests funds for additional computer costs and a related subcontract to Travelers Insurance Company for additional labor on the simulation models which this project has been developing. The simulation model for floods, as noted by documents in the project file, has already been used by the U.S. Corps of Engineers. The Advisory Committee has continued to encourage the project's modeling efforts. At its last meeting the Committee again strongly endorsed this work and urged that additional funds be secured through a supplemental request. Mr. Robert Schnabel, Chief, Disaster Preparedness Division, FDAA, expressed the hope that his agency would soon be able to utilize the project's models. The initial award provided \$11,500 for computer services and this sum has been expended or encumbered. The supplement requests \$12,168 for additional computer work and \$4,616 for labor on a related subcontract with Travelers Insurance Company.

The expanded utilization effort which this supplement supports will aid the SSHR Division in its efforts to evaluate the products from the research which it supports.

SUPPORTED BY U.S. Natl. Science Foundation

D. MCCONNOR, Natl. Acad. of Sciences, District of Columbia 20037

Reduction in the time from the onset of initial response until the provision of definitive medical care of the thousands of lives and reducing disability. Although relatively little can be done to reduce travel time, communications techniques offer potential benefits by: improving citizen entry into the system, coordinating the dispatch of resources, and hospitals are alerted for arrival of patients, and professional medical advice and definitive intervention route or at the scene of need.

Funds granted under this program will be utilized for the development costs of organizing a new emergency system. Examples of such costs are: training emergency dispatchers and ambulance attendants; communications hardware (such as mobile radio units and stations), and educating citizens in the use of the program is planned as a one-time national effort. Commitment provided for any financial support on a continuing basis, and is viewed as a needed major step to establish well-planned, compatible, regional emergency communications systems to coordinate emergency disaster medical services throughout geographic areas.

SUPPORTED BY R. W. Johnson Found. - New Jersey

#### 16.0030, NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS

G.T. SAV, U.S. Dept. of Commerce, Natl. Bureau of Economic Research, Washington, District of Columbia 20234

This study examines the extent of some of the losses from natural disasters. An estimate of these losses is made in order to determine the potential benefits that could be realized from mitigating the negative economic impact of natural disasters. Absolute and relative losses from hurricanes, floods, earthquakes, and tornadoes are estimated. This data will help individuals, communities, and the government make better decisions as to how and where protection against disasters should be provided. A comparison of benefit-cost analysis for choosing the optimal protection against disasters is also discussed. Recommendations are made for further research in determining the economic feasibility of various techniques to mitigate the losses from disasters.

Pub. Feb. 74: 63p., U.S. Govt. Print. Office, SD C 70-01 or NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.B.

#### 16.0031, EVALUATION OF EMERGENCY COMMUNICATION SYSTEMS

R.H. EMERY, U.S. Dept. of Transportation, Federal Highway Administration, Washington, District of Columbia 20541 (2R53081610)

Existing emergency communication systems are evaluated on the basis of data accumulated on their operation to establish a relationship of significant system characteristics to service.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - FHWA

#### 16.0032, NATIONAL SEARCH AND RESCUE COMMUNICATION SYSTEM PLAN (PINSARS)

C. MUNDO, U.S. Dept. of Transportation, Transportation Systems Center, Cambridge, Massachusetts (0388880)(TRAIS)

The objective of this effort is to develop a conceptual plan for integration of search and rescue SAR telecommunications alerting and locating devices currently in being or under development. This requires an understanding of existing electronic SAR devices presently being used in military and civil applications as well as devices under development by the military and civil agencies. SAR telecommunication requirements and responsibilities must be interfaced with technical potentialities and economic constraints. From this interface analysis an optimum system will be postulated. A time phased plan will be prepared projecting the development, testing, and implementation sequence.

Document provided to S.S.I.E. by the T.R.A.I.S.

SUPPORTED BY U.S. Dept. of Transportation - Off. Sec.

### 16.0033, COMMUNICATIONS IN NATURAL DISASTERS

R.A. STALLINGS, Ohio State University, Disaster Research Center, Columbus, Ohio 43210

Abstract: Field data collected on a sample of twenty-four natural disasters in the United States during the years 1963 through 1970 are analyzed in a summary of communication processes and problems. Communication is defined as a process in which messages are sent from one point to another, while communication structure denotes the patterned relationships among parts linked in this process. Three kinds of communication structures are examined. Internal communication refers to message transmission between points within single organizations; interorganizational communication involves messages passing between two or more separate organizations; and public-to-organization communication refers to messages received by groups from a number of individual members of the general public. In the discussions of each of these three types of communication relationships, typical problems encountered in disaster situations are mentioned, the more common ways in which communication capability is increased and demands reduced are outlined, and the most frequent changes in communication patterns initiated following involvement in an actual disaster are described.

Pub. Jan. 71: 58p., NTIS No. AD-723 993: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### 16.0034, DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER

UNKNOWN, Luzerne Co. Transp. Authority, Wilkes Barre, Pennsylvania 18711 (2R84232619)

The purpose of this project is to design and implement a transit system for use following a natural disaster with maximum retention of emergency generated riders. Ways of reducing auto congestion in the central business district are to be devised.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - U.M.T.A.

The purpose of this study is to develop methods for evaluations of impacts of highways on natural factors and natural factors on highways, means of broadly mapping such relationships, and means of conveying useful information for system and corridor location and design study stages. Natural factors include tides, floods, snows, subsidence, wind, fog, frost, erosion and earth movements, and earth heat.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

### 16.0036, PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM SERVING THE EMERGENCY SERVICE DEPARTMENTS OF THE CITY OF LOS ANGELES (ABBREV)

UNKNOWN, Hughes Aircraft Company, Fullerton, California 92634

Abstract: Because increasing requests for emergency services threaten to completely outgrow present capabilities for handling them, the City of Los Angeles recognized the need to develop an improved Emergency Command Control Communications System for their emergency service departments - police, fire and ambulance. The study defines a conceptual design and a master plan for such an integrated system.

Pub. Jan. 71: 49p., NTIS No. PB-202 250: PC \$3.00 MF \$0.95.

SUPPORTED BY No Formal Support Reported

### 16.0037, OPTIMUM UTILIZATION OF GOVERNMENT AND NON-GOVERNMENT COMMUNICATIONS RESOURCES

A.W. WIEGANT, Stanford Research Institute, Menlo Park, California 94025

Abstract: A number of communication resources exist that are applicable to and available for Civil Defense emergencies to augment and substitute for common carrier and other primary communication means. The study describes the resources and comments on their applicability and the constraints on their utilization. A useful technique for providing guidance to local communications directors to assist in optimum use of communications resources is described.

Pub. Oct. 71: 160p., NTIS No. AD-734 855: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### 16.0038, URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines & Geology, Sacramento, California 95814

Abstract: This report recommends loss-reduction measures for 10 geologic problems which collectively threaten an estimated \$55 billion loss in California's urban areas from 1970 to 2000. The problems are earthquake shaking, loss of mineral resources to urbanization, landsliding, flooding, erosion activity, expansive soils, fault displacement, volcanic hazards, tsunami hazards, and subsidence. The report describes the nature, distribution, and magnitude of each problem, as well as costs and effectiveness of possible loss-reduction measures, and agencies responsible for those measures.

Pub. Jan 73: 111p., NTIS No. PB-222 447/5: PC \$7.75 MF \$1.45

**R.L. LAMOUREUX**, System Development Corporation, Santa Monica, California 90406

**Abstract:** The final report of the improved outdoor alerting and warning project describes the role of improved outdoor alerting and warning in the overall warning system as it is currently being developed. It also describes the conclusions and recommendations concerning the areas identified as requiring further research and development.

Pub. Oct. 68: 111p., NTIS No. AD-845 552: PC \$3.00 MF \$0.95.

**SUPPORTED BY** No Formal Support Reported

#### **16.0040, REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974**

**UNKNOWN**, Internat. Joint Commission, Washington, District of Columbia 20440

The report contains analyses, findings and conclusions of a study of the various factors which affect the fluctuations of the water levels of the Great Lakes, and which determine actions that would be practicable and in the public interest from the points of view of both the United States and Canadian Governments, for the purposes of bringing about a more beneficial range of stage for, and improvement in: (a) domestic water supply and sanitation; (b) navigation, (c) water for power and industry; (d) flood control; (e) agriculture; (f) fish and wildlife; (g) recreation; and (h) other beneficial public purposes. The report also contains Great Lakes physical and hydrological data.

Pub. 1974: 37p., No copy info. available.

Abstract provided by FDAA.

**SUPPORTED BY** No Formal Support Reported

#### **16.0041, REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD**

**UNKNOWN**, Internat. Joint Commission, Washington, District of Columbia 20440

The purpose of this study are: (1) to review the various factors affecting the fluctuations of the water levels of the Great Lakes; (2) to determine the feasibility of regulating further the water levels in the Great Lakes and connecting channels so as to bring about a more beneficial range of stage and other improvements for the purposes enumerated in the Reference; (3) to determine the changes in existing works or other measures within the basin needed to accomplish such regulation that would be practicable and in the public interest; (4) to provide an estimate of the costs of such measures; and (5) to indicate the probable effects, beneficial or adverse, in each country of any regulation plans or measures proposed. The study considers all major interests affected by the water levels of the Great Lakes.

Pub. Dec. 73: 294p., No copy info. Available.

Abstract provided by FDAA.

**SUPPORTED BY** No Formal Support Reported

#### **16.0042, EMERGENCY EQUIPMENT STANDARDS**

**A.T. HORTON**, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234 (4009410/NRS)

Expected results. Report on Emergency Vehicle Lights; State of the Art. Standard for Flashing Standard for Sirens, User Guidelines for Lights and S

**SUPPORTED BY** U.S. Dept. of Justice

#### **16.0043, ESSA AND OPERATION FORESIGHT**

**UNKNOWN**, U.S. Dept. of Commerce, Natl. Oceanic Admin., Washington, District of Columbia 20

A report on ESSA's performance before and during floods in the Midwest, March-April 1969, based on how ESSA's River and Flood Forecast and Warning Service performed during the disastrous flood situation occurring in the Midwest. This report is a review of effectiveness of forecasts and warnings prior to and after the disaster.

Pub. May 69: 44p., ESSA/PI 690030, U.S. Dept. of Commerce - ESSA.

Abstract provided by FDAA.

**SUPPORTED BY** U.S. Dept. of Commerce - E.S.

#### **16.0044, MINIMIZING DAMAGE TO REFINERIES IN THE EVENT OF A NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS**

**M.M. STEPHENS**, U.S. Dept. of the Interior, Office of Oil and Gas, Washington, District of Columbia 20242

**Abstract:** The object of this publication is to provide information on refinery management and technical personnel for the purpose of minimizing the damage to installations and equipment caused by hurricanes, tornadoes, fires, earthquakes, and the similarity of such forces created by nuclear weapons; (2) The probable magnitude of the destruction resulting from a blast disaster; (3) The research done by government agencies and industry which point out ways to make a modern oil refinery to make it more damage resistant within the realm of economic judgment. Other problems to be expected in time of war.

Pub. Feb. 70: 256p., NTIS No. AD-773 048/4: PC \$1.45.

**SUPPORTED BY** U.S. Dept. of Defense - Army

#### **16.0045, SUMMARY REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971**

**R.C. KOCH**, Geomet Incorporated, Rockville, Maryland

This report summarizes the important developments in attempts to modify the weather that have occurred in the United States and abroad during the Federal fiscal years 1969, 1970 and 1971. The activities covered include operational and experimental studies in the field and laboratory. The weather phenomena include rain, hail, hurricanes, tornadoes, hailstorms, and fog. The report also evaluates social, economic, legal, and ecological considerations in addition to the technical aspects.

Pub. May 73: 163p., Pub. USDC, NOAA, GPO 0317-00101, PC \$1.25.

Abstract provided by FDAA.

**SUPPORTED BY** U.S. Dept. of Commerce - N.O.

#### **16.0046, FEDERAL PLAN FOR WEATHER RADIATION**

system needed to provide these vital services to the Nation. The Plan was prepared by the Interdepartmental Committee for Meteorological Services and the Interdepartmental Committee for Applied Meteorological Research. It replaces the Federal Plan for Weather Radars and Remote Displays issued in December 1969.

This Plan has been developed in response to guidelines provided by OMB Circular A-62 and specific findings and recommendations in the Report to the Congress on Disaster Preparedness by the Office of Emergency Preparedness, January 1972. The Agnes Floods by the National Advisory Committee on Oceans and Atmosphere, November 22, 1972, and other disaster survey reports. Concepts developed in earlier Plans have been updated to take advantage of modern technology. Federal agencies concerned with weather radar have participated in preparing this Plan; specifically, the Departments of Commerce, Defense, Interior, and Transportation, the National Aeronautics and Space Administration, and the National Science Foundation.

Pub. Nov. 1973; 58p., stock no. FCM 73-5. U.S. Dept. Comm., NOAA, Wash., D.C.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 16.0047, A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE

G.F. HEIN, U.S. Natl. Aero. & Space Adm., Lewis Research Center, Cleveland, Ohio

Abstract: Various types of weather communications are required to alert industries and the general public about the impending occurrence of tornados, hurricanes, snowstorms, floods, etc. A natural disaster warning satellite system has been proposed for meeting the communications requirements of the National Oceanic and Atmospheric Administration. Message traffic for a communications satellite was simulated with a digital computer in order to determine the number of communications channels to meet system requirements. Poisson inputs are used for arrivals and an exponential distribution is used for service.

Pub. 1972; 60p., NTIS No. N72-32182; PC \$5.00 MF \$0.95.

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

#### 16.0048, DISASTER WARNING SATELLITE STUDY

UNKNOWN, U.S. Natl. Aero. & Space Adm., Lewis Research Center, Cleveland, Ohio

Abstract: The Disaster Warning Satellite System is described. It will provide NOAA with an independent, mass communication system for the purpose of warning the public of impending disaster and issuing bulletins for corrective action to protect lives and property. The system consists of three major segments. The first segment is the network of state or regional offices that communicate with the central ground station; the second segment is the satellite that relays information from ground stations to home receivers; the third segment is composed of the home receivers that receive information from the satellite and provide an audio output to the public. The ground stations required in this system are linked together by two, separate, voice bandwidth communication channels on the Disaster Warning Satellites so that a communications link would be available in the event of disruption of

#### 16.0049, INITIAL OBSERVATIONS ON PROBLEMS AND DIFFICULTIES IN THE USE OF LOCAL EOC'S IN NATURAL DISASTERS

E.L. QUARANTELLI, Ohio State University, Disaster Research Center, Columbus, Ohio 43210

Abstract: An initial examination was made of the use of emergency operations centers (EOCs) in natural disasters in American society in the last eight years. Problem areas were noted in participation in EOCs, tasks carried out at EOCs, the location of EOCs, and the time of activation of EOCs. However, EOCs were found to be of value and important in a response to community emergencies.

Pub. May 72; 7p., NTIS No. AD-745 407; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

### HAZARD REDUCTION

#### 16.0050, PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW

UNKNOWN, Unknown Inst. or Indiv. Grant, California

Abstract: The report is from a USAC series produced by the City of Long Beach, California, covering activities from systems analysis through implementation and evaluation of urban information systems. It is an overview of the systems analysis of the public safety function. Public safety in the City of Long Beach is performed by the police, fire and emergency preparedness departments. In addition, licensing and code enforcement as it relates to public safety is included. The summary report depicts current operations of the various public safety components and their relation to other municipal, state, and federal agencies. The activities and findings related to the systems analysis, which are requisite to implementing a prototype information system, are documented.

Pub. Nov. 70; 41p., NTIS No. PB-208 488-01; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0051, PUBLIC SAFETY SUBSYSTEM - CONCEPTUALIZATION TASK COMPLETION REPORT

UNKNOWN, Unknown Inst. or Indiv. Grant, California

Abstract: The report is from a USAC series produced by the City of Long Beach, California, covering activities from systems analysis through implementation and evaluation of urban information systems. It documents findings related to the development of system concepts at the component level. Components are conceptualized for the police, fire, and emergency preparedness functions. The concepts are derived from findings obtained in the systems analysis task and from the functional requirements which were so identified. Task objectives are delineated, and task methodology is given. Regional and state interfaces are also identified.

Pub. Feb. 71; 294p., NTIS No. PB-208 489; PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0052, THE DEVELOPMENT OF A MEANS FOR ASSESSING EMERGENCY MEDICAL RESOURCES



extent of its medical resources. As a contribution of the five-city study, the resources in San Jose, California are assessed, and then subjected to a hypothetical nuclear detonation. Models are developed which evaluate the weapon effects on the resources and the demand for them that is generated by the injuries caused by the detonation. Measures of effectiveness for any post-attack medical treatment system are also discussed.

Pub. Aug. 69: 126p., NTIS No. AD-866 717 PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0053, NATURAL DISASTER OPERATIONS PLANNING

C.T. RAINEY, Stanford Research Institute, Menlo Park, California 94025

**Abstract:** This research was concerned with development of a general concept of emergency operations for natural disaster situations and a prototype natural disaster operations plan (NADOP). The concept is based on classifying the several types of disaster agents according to whether they have a destructive impact or a paralyzing effect on an operating zone. Contingencies provided for in the concept include alert, distant from impact, close to impact, damaged, but tenable, untenable, moderate hazards, and extreme hazards. Countermeasure actions are identified for each contingency. Nine basic operating situations (BOS) are defined according to the severity (negligible, moderate, extreme) of the threats posed by each class of disaster agent, either singly or in combination.

Pub. Mar. 72: 63p., NTIS No. AD-740 187: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0054, ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT

D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

The quality of the environment and the application of earth science data to planning for urban areas are of concern to both the Department of Housing and Urban Development and the Department of the Interior. These agencies are jointly sponsoring an environmental planning research and demonstration study in the San Francisco Bay region which will guide similar planning efforts throughout the Nation. This study is designed to develop and interpret earth science data so that we may improve comprehensive planning on regional, county, and local scales and establish a sound basis for environmental decision-making when urban expansion occurs.

Pub. 1971: 204p., stock No. 2300-1195, U.S. Govt. Printing office, Wash., D.C., PC \$2.75.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 16.0055, GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA

E.H. PAMPEYAN, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

States to which project pertains: California.

Small-scale (1:250,000) maps of coastal California are being

large landslides, ground subsidence, and engineering properties of rock and sediment units.

Graphic and conceptual techniques depicting in map form what is known about recency of fault displacement have been devised. Using these techniques, a pilot geologic environmental map of the greater Los Angeles area has been compiled and published, together with explanatory text and table of engineering properties. A map showing recency of faulting in coastal southern California has been prepared and will be released in 1974.

The coastal strip from Point Arguello to Monterey Bay will be completed during 1974. The Monterey Bay to Point Arena strip will be compiled in 1974-75 largely from data gathered during the USGS-HUD San Francisco Bay Region study. The segment between Point Arena and Oregon, which will require more extensive field investigations because of limited existing sources of geologic data, will be compiled later.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 16.0056, SOIL ENGINEERING RESEARCH - CALIFORNIA

T.L. YOUNG, U.S. Dept. of the Interior, Geological Survey, Menlo Park, California 94025

**The Soil Engineering Research Project:** (1) Contributes to interdisciplinary topical investigations of engineering geologic problems and hazards with original research concerning, and applications of, soil engineering principles and methods. Current emphasis is on the potential hazards associated with the San Francisco Bay sediments; specifically, seismic ground amplification, liquefaction susceptibility of granular deposits static and seismic stability of slopes and dikes, total and differential settlement from overburden fills, and subsidence from groundwater extraction. (2) Supports regional engineering geologic and environmental geologic studies with (a) determinations of the engineering classification and in situ state properties of unconsolidated earth deposits, (b) correlations of these properties with geologic variables, and (c) interpretations of their significance for land-use planning and engineering purposes. Current emphasis is on the unconsolidated deposits and residual soils in the San Francisco Bay region.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 16.0057, ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TORNADOES AND HURRICANES

P. DERGABEDIAN, T R W Incorporated, Redondo Beach, California 90278

**Abstract:** Two methods are proposed for estimating maximum azimuthal velocity component for fully-developed meteorological vortices from data usually available. One method, principally for tornadoes, uses photographic evidence of the cloud-deck height, the core radius, and the funnel shape. The other, applicable to both tornadoes and hurricanes, uses the tephigram for air at the outer edge of the storm. Calculated cases confirm that the lower maximum wind speeds suggested by recent workers (crudely one-quarter of sonic speed for sea-level air) are more plausible for tornadoes than the sonic speeds sometimes cited a decade ago. Furthermore, winds of hurricane magnitude and more are shown to be consistent with a model in which heat and mass transfer between ocean and the very low atmosphere is taken as negligible in a fully developed typhoon. The suggestion is made that while heat and mass transfer from the ocean or lower atmosphere may be important in the transient

**16.0058, THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN**

D. ARMSTRONG, Tri Cities Seismic Safe. Study, *Richmond, California* 94806

The Seismic Safety Study for the General Plan is one of three reports issued by the Tri-Cities Study. Pursuant to State Law enacted in 1972, all California cities must include a Seismic Safety Element in their General Plan. This Study is the first major Seismic Safety Study for the General Plan produced in the State and will be distributed as a model to all California cities by the California Council on Intergovernmental Relations. The essential parts of the Seismic Study are: 1) Detailed Findings of the earthquake situation in the Tri-Cities Areas, including geologic and structural factors, present uses and disaster implications, 2) Policies to guide future development and regulate existing development, and 3) Specific recommendations for action by the cities.

Pub. Sept. 73: 199p., Calif. Council on Intergovernmental Relations, Sacramento, Calif. 95816, and NTIS.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**16.0059, EMERGENCY OPERATIONS CONTINGENCY PLANNING - NEW ORLEANS, LOUISIANA**

A.I. ABERSMAN, System Development Corporation, *Santa Monica, California* 90406

Abstract: The document describes the results of a study for the development of prototype emergency operations contingency plans based upon the operational environment found in New Orleans, Louisiana. The report describes the study method used; the concept of operation under which the plans would be developed; it critiques and evaluates the planning methods; and provides recommendations for planning. Appendices contain examples, for developmental use only, of prototype plans which were developed from this study for operating zones.

Pub. Mar. 69: 199p., NTIS No. AD-849 888. PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**16.0060, DEVELOPMENT OF IMPROVED EMERGENCY OPERATIONS SIMULATION TRAINING (EOST) TRAINING PROCEDURES**

R.C. HARKER, System Development Corporation, *Santa Monica, California* 90406

Abstract: The report presents procedures for the development of improved DCPA (Defense Civil Preparedness Agency) Emergency Operations Simulation Training (EOST) exercises conducted for local jurisdictions. The Research Directorate of DCPA is developing a set of Emergency Operating Planning Master Checklist documents relating to nuclear (NEOP) and natural (NADOP) disasters and covering zonal and areawide government operations. These documents are admirably suited to provide bases for local planning as they include recognition of damage from current estimates of nuclear attack capabilities and from natural disasters. Data are being developed for countermeasure actions relating to crisis buildup and warning periods as well as to post-attack recovery and remedial movement. The revised procedures for the improved EOST exercise program specifically include the use of the Master Checklist documents as the bases for the

**16.0061, A COMPARATIVE ANALYSIS OF PUBLIC SUPPORT OF AND RESISTANCE TO WEATHER MODIFICATION PROJECTS**

J.E. HAAS, Univ. of Colorado, Graduate School, *Boulder, Colorado* 80302

This grant is a continuation of research conducted under GA-28364, and examines the conditions and agency actions which encourage public and interested group support rather than resistance to planned weather modification projects. Since planned weather modification efforts are moving increasingly from experimental to operational projects, the attitude of the public toward such operations is rapidly becoming a crucial factor in determining whether such programs will continue to be supported. It is evident that the way in which weather modification scientists and administrators approach the economic and social conditions in and near the target area may be the deciding factor as to whether conflict or acceptance will result. Existing or planned projects will be examined whether funded by Federal or State sources as well as those funded by local citizens and carried out by commercial operators. It is expected that this study will result in a set of policy guidelines for site selection and for working with interested persons and groups during the course of weather modification projects, to insure that the public will be adequately informed and that maximum benefits may be derived from the economic and social standpoint.

SUPPORTED BY U.S. Natl. Science Foundation

**16.0062, UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS**

D. RICHARD, Univ. of Denver, Graduate School, *Denver, Colorado* 80210

This workshop will attempt to summarize the state-of-the-art and critical areas needing research in the area of the behavior of expansive earth materials. Damage resulting from the action of expansive or shrinking earth materials was estimated at 2 billion dollars per year in a recent ASCE-Civil Engineering Magazine article.

The workshop will consist of general discussions and five specific areas of interest as follows: 1. Pavements - highways, roads, streets, airports and parking facilities. 2. Light Buildings - residential buildings, schools, light commercial buildings, etc. 3. Heavy Buildings - single and multistory industrial and commercial buildings, power and pumping plants, etc. 4. Other Facilities Problems - buried utilities, canals, large pipelines, dams, landslides, etc. 5. Organization, planning and financing for accomplishing general objectives, as related to Workshop findings. Coordination, liaison and technical input to assigned groups.

SUPPORTED BY U.S. Natl. Science Foundation

**16.0063, WEATHER AND CLIMATE MODIFICATION - PROBLEMS AND PROGRESS**

UNKNOWN, Natl. Acad. of Sciences, *Washington, District of Columbia* 20037

Abstract: The report not only emphasizes outstanding problems but also reviews recent work on the artificial modification of precipitation, the dissipation of fogs, and the modification of hailstorms, hurricanes, and other weather hazards. It also considers the important role of statistics in meeting requirements for better experimental designs and more relevant techniques for data analysis. In discussing national goals for

tion of local weather and global climate as a result of human activities.

Pub. Jun. 73: 275p., NTIS No. PB-224 193/3: MF \$1.45.

SUPPORTED BY Natl. Academy of Sciences - Washington

# 16.0064, FIELD STUDIES OF DISASTER BEHAVIOR - AN INVENTORY

UNKNOWN, Natl. Acad. of Sciences, Washington, District of Columbia 20037

Abstract. The document provides a relatively complete list of the field studies on human behavior in disasters that have been conducted by behavioral scientists. It is intended to assist research personnel, administrators, and others interested in disaster research findings in the identification and location of pertinent reports and other research products. Emphasis in the inventory is primarily on studies of peacetime disasters affecting civilian groups and populations. It catalogs 114 field studies of human behavior in 103 different disaster situations. It provides a brief description of each event; the date, location, and damage produced; the number of interviews obtained in the study; the agency and personnel responsible for the research; and a list of the pertinent published and unpublished reports.

Pub. 1961: 89p., NTIS No. AD-267 652/6: PC \$6.50 MF \$1.45.

SUPPORTED BY Natl. Academy of Sciences - Washington

# 16.0065, TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES

UNKNOWN, Natl. Acad. of Sciences, Washington, District of Columbia 20037

This condensed summary of conclusions reached by the Committee on the Alaska Earthquake suggests measures that can be taken to minimize loss of life and property in future earthquakes. It is based on a careful review of events during and following the disaster that befell south central Alaska in March 1964. Emphasis is on lessons to be learned from the Alaskan experience that can be applied to any region where strong earthquakes may be expected.

The Committee's recommendations are given in the first chapter. The second chapter presents the more detailed conclusions reached by the seven specialized panels among which the Committee's work was divided. The final chapter is a brief recounting of the major events of the Alaska earthquake and its aftermath, to call to mind the experience on which the recommendations are based.

Pub. 1969: 35p., Printing and Publishing Office, Natl. Academy of Sciences, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY Natl. Academy of Sciences - Washington

# 16.0066, WEATHER & CLIMATE MODIFICATION PROBLEMS AND PROGRESS

UNKNOWN, Natl. Acad. of Sciences, Washington, District of Columbia 20037

An evaluation in depth of technical programs covering the whole spectrum of weather modification activities, including inadvertent changes, and recommendations for continuing carefully devised experiments to define the limitations as well as the capabilities of such activities.

Pub. 1973: 258p., Print. & Pub. Off., NAS.

Abstract provided by FDAA.

R.L. PYLE, U.S. Dept. of Commerce, Natl. En-  
Serv., Washington, District of Columbia 20230

Abstract. The paper presents a summary of present satellite capabilities and indicates that its full use is only begun to be realized. Weather satellites provide a wide variety of direct, continuing benefits to observation and prediction programs in the United States and overseas. Major applications have been in weather and forecasting services but satellite data are increasing extent in other environmental service activities, hydrology, space disturbance monitoring, and others. Examples are given to show how satellites are contributing to better weather forecasts, more accurate bulletins, and more reliable warnings of natural hazards.

Pub. 1972: 12p., NTIS No. COM-73-10327: Reproduction  
SUPPORTED BY U.S. Dept. of Commerce - National

# 16.0068, FEDERAL PLAN FOR WEATHER RADARS

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20037

Abstract. The plan for weather radars describes the national weather radar resources in providing forecasts of severe weather for all walks of life. U.S. Information is given on disaster warning, weather forecasting, special Department of Defense operations, and operational concepts. An international weather radar network has been constituted to provide services to the Nation. This operational system consists of 57 radars operated by NOAA and 11 AN/CPS-9, and AN/FPS-41 weather radars of the Dept. of Defense on an interim basis. Also planned for the network are 23 AN/FPS-77 and AN/CPS-9 facilities of the Dept. of Defense acting as alternate sites.

Pub. Nov. 73: GSp., NTIS No. COM-74-10201/3: MF \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - National

# 16.0069, FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FY 1973

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20037

Abstract: Provided is a description of the Basic and Advanced Meteorological Services and of the various activities improving these services. Additionally, a special section is provided in the area of weather disaster warning. This covers the programs of all agencies for FY 1973. Much of the FY 1973 activity is aimed at improving the basic meteorological system through a variety of activities, utilizing larger capacity computers, improved forecasting models, and improving the preparation of the public to respond to warnings.

Pub. Jan. 72: 77p., NTIS No. COM-72-50391: MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - National

# 16.0070, FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FY 1975

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20037

programs designed to reduce the economic and social impact of natural disasters, promote the Nation's welfare and economy, preserve and enhance the environment and strengthen the national security.

The introductory section to this Plan highlights many aspects of interagency cooperation that is so essential to meet the needs for meteorological services now and for the challenges of the future. This section is followed by a brief fiscal summary of the overall Plan.

Basic and Specialized Meteorological Services and Supporting Research are described in the next section along with the operational and research programs for fiscal year 1975. The fourth major section of this Plan treats meteorological services from the functional viewpoint. Observations, analyses and forecasts, communications, dissemination, and general agency support are covered.

The final section describes the meteorological satellite program as a separate discussion. The last page of this Plan lists the publications prepared, or in the process of preparation, by the Federal Coordinator for Meteorological Services and Supporting Research.

The coordination of weather activities and the preparation of the Federal Plan is performed by the interagency committees shown on the inside front cover. These committees and their subcommittees conduct systematic, continuous reviews of basic and specialized meteorological requirements, services, and supporting research.

Pub. June 74; 60p., U.S. Dept. Comm. NOAA, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 16.0071, A FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin., Washington, District of Columbia 20235

The 'Report to the Congress on Disaster Preparedness' by the Office of Emergency Preparedness, January 1972, and the report, 'The Agnes Floods' by the National Advisory Committee on Oceans and Atmosphere, November 22, 1972, together with other disaster surveys, have identified many unmet needs in the existing natural disaster warning system and community preparedness. This Plan addresses those unmet needs within the concept of a balanced program which recognizes the close interaction between the warning system and community preparedness. The unmet needs are many, however, and together with the very nature and complexity of the phenomena with which we are dealing lead to program planning that extends over several years in order to achieve improvements necessary to meet these needs. Assuming a continuation of current priorities and present rate of funding, this Plan describes the long-range efforts of all Federal agencies with responsibilities to warn about, prepare for, and mitigate the impact of potential geophysical natural disasters, including those caused by hurricanes, tornadoes, floods and earthquakes. In this Executive Summary of the Plan, features of the warning system and community preparedness that are common to several of these phenomena are discussed first, followed by sections dealing with the specific phenomena.

Pub. June 73; 123p., U.S. Govt Printing Office, Wash. D.C., PC \$2.10.

UNKNOWN, U.S. Dept. of Commerce, Off. of Plans & Programs, Washington, District of Columbia 20234

This National Oceanic and Atmospheric Administration Plan to Improve Local Weather Forecasts places particular emphasis on the 0-to 6-hour time period of the weather service to the general public and special user groups. As a result of the varied needs of these services, the meteorological problems within the present range of interest are many and diverse. Also involved are internal operating procedures and methods of working with the public.

The program identifies fundamental problems that must be solved if we are to improve the timeliness and accuracy of forecasts and warnings. The achievement of this objective is dependent on an experimental facility to be utilized for 1) development of equipment and technology, 2) translation of new knowledge and theory into operational forecast procedure, and 3) support to specialized data gathering projects.

The plan includes cost estimates of the many interrelated actions to be accomplished in five phases. These estimates may require adjustment as the results of R&D efforts are applied and the need for new equipment, procedures, and research become apparent.

Pub. Mar. 71; 43p., U.S. Dept. Comm. NOAA, Wash., D.C.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 16.0073, BUILDING PRACTICES FOR DISASTER MITIGATION

R.N. WRIGHT, U.S. Dept. of Commerce, Natl. Bureau of Standards, Washington, District of Columbia 20234

Abstract: The National Workshop on Building Practices for Disaster Mitigation was concerned with earthquakes, extreme winds, and similar dynamic hazards. These proceedings present recommendations derived at the workshop and addressed to policy makers in government and industry, as well as practitioners in engineering, architecture, land use planning, and the earth and meteorological sciences. The recommendations evaluate current building practices, define opportunities for improving current practice from documented research findings, and recommend research to fill gaps in knowledge. The objectives include avoidance of human suffering, reduction of property loss, and maintenance of vital function in buildings under conditions threatening disaster. Fifteen review articles were prepared by experts in the professions and research disciplines to define the state of the art in disaster mitigation and to guide discussions at the workshop; the articles are included in the proceedings.

Pub. Feb. 73; 482p., NTIS No. COM-73-50188: PC-GPO MF \$0.95.

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

#### 16.0074, SEISMIC HAZARDS AND LAND-USE PLANNING

D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Basic earth-science data are necessary for a realistic assessment of seismic hazards and as a basis for limiting corrective land-use controls only to those areas of greatest hazard. For example, the location, character, and amount of likely displacement and activity of surface faulting can be predicted if detailed geologic maps and seismic data are available and are supported by field studies at critical localities.

Two methods of predicting ground shaking effects have applications to land-use decisions: (1) Relative earthquake effects can be related to firmness of the ground and can be used in a gross way to allocate population density in the absence of more sophisticated analyses; and (2) intensity maps, based on (a) damage from former earthquakes, or (b) a qualitative analyses of geologic units added to a design earthquake, can be helpful both for general and specific plans. Theoretical models are used with caution to predict ground motion for critical structures to be located at specific sites with unique foundation conditions. Fully adequate methods of assessing possible shaking remain to be developed. Where land-use decisions do not reflect likely ground shaking effects, stringent building codes are needed, particularly for important structures.

Ground failure (landsliding, ground cracking and lurching, differential settlement, sand boils, and subsidence) commonly results from liquefaction, loss of soil strength, or compaction. Areas suspected of being most likely to fail should not be developed unless detailed site studies can demonstrate the hazard does not exist or can be overcome. Various methods can be used to reduce the high, long-term public costs that follow development of unstable ground. However, areas subject to tectonic deformation generally cannot be predicted nor can effects of such deformation be minimized.

Large water waves, such as produced by tsunamis, seiches, and dam failure or overtopping, can be anticipated in many places. (Text Abridged)

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 16.0075, PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY

UNKNOWN, U.S. Dept. of the Interior, Geological Survey, Washington, District of Columbia 20242

Abstract: A comprehensive guide to a study of the 9-county San Francisco Bay Region describes a 4 year research-demonstration study conducted jointly by the Geological Survey and the Department of Housing and Urban Development, designed to improve urban development decisions and land-use planning through application of innovative earth science concepts. Urban-related environmental studies include: active faults and earthquake hazards, landslides and slope instability, physical and chemical properties of San Francisco Bay and its circulation patterns, water-quality and pollution, areas subject to flooding, water supply and waste-disposal systems, and available mineral and water resources. Planning program elements described include state-of-the-art review and analysis, a feasibility study of incorporating earth-science data into urban planning information systems, and application and demonstration studies.

Pub. Oct. 71: 121p., NTIS No. PB-206 826: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

#### 16.0076, NATIONAL ATMOSPHERIC SCIENCES PROGRAM - FISCAL YEAR 1974

UNKNOWN, U.S. Exec. Office of the Pres., Off. of Science & Technology, Washington, District of Columbia 20006

This National Atmospheric Sciences Program Report, prepared annually in the Spring, serves a number of essential and useful purposes. Primarily, it is intended to inform the Executive

There are two other principal documents which ICAS Annual Report. They are published as Federal Coordinator for Meteorological Services Reporting Research (FCMS&SR). The first of Federal Plan for Meteorological Services a Research, which is submitted to the Congress of Management and Budget in accordance with 87-843. The second is the World Weather Program each fiscal year, which is transmitted annually to the Congress. The latter plan describes participation in the World Weather Watch and atmospheric Research Program.

The ICAS Annual Report which follows begins with tables which set forth the fiscal funding data for atmospheric sciences programs. The principal report follows the fiscal data and contains descriptions of the member agency programs. The third at the end of the report contain a more discussion of weather modification program Research Classification System upon which categories used in the report are based, and mentioned subcommittee descriptions.

Pub. May 73: ICAS 17-FY 74.

Abstract provided by FDAA.

SUPPORTED BY No Formal Support Reported

#### 16.0077, REPORT TO THE CONGRESS ON DISASTER PREPAREDNESS

UNKNOWN, U.S. Exec. Office of the Pres., Off. of Management & Budget, Washington, District of Columbia 20006

The report reflects a comprehensive study of the natural disasters experienced in the United States findings and potential solutions to prevent or loss of life and damage to property. Careful was given to the views of Federal agencies, State governments, professional and trade associations and academic institutions, private volunteer and individual experts. The final analysis and recommendations, however, were developed independently by an Office of Management & Budget Disaster Study Group. The of this report points to the need for improved preparedness at all levels. The findings contain initiatives for moving further toward an improved national disaster preparedness program.

Pub. Jan. 72: 195p., U.S. Govt. Print. Office, Stock Number 0006, PC \$2.75.

Abstract provided by FDAA.

SUPPORTED BY U.S. Executive Office - O.E.O.

#### 16.0078, LABORATORY STUDIES OF THE PHYSICAL HAZARD ON SHELTER MANAGEMENT BEHAVIOR - PHASE I - STUDY PLAN

T.R. ARMSTRONG, Amer. Inst. for Res., Miami, Florida 33136

Abstract: The goal of the project was to develop mental design and supporting materials and procedures for a research project intended to identify and validate effective management behavior under threat. The product of the project is a Study Plan intended to be used as a laboratory study of the effects of human leadership/management behavior, relative to the situation of a shelter manager in an actual disaster situation.

Pub. Dec. 72: 66p., NTIS No. AD-759 843: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**16.0079, THE INVESTIGATION OF SHELTER MANAGEMENT AND CONTROL IN NATURAL DISASTER**

*R.A. COLLINS, Amer. Inst. for Res., Miami, Florida*

Abstract: The study was performed to determine: (1) what management problems existed in natural disaster shelters and (2) the excellence of the natural disaster shelter situation as a source of information relevant to fallout shelter management. Contracts were made through the American Red Cross with individuals who had been sheltered as a result of some natural disaster and who had taken on management as well as non-management roles. Most of these individuals were found in the Harrisburg, Pennsylvania, area and had experienced sheltering as a result of the flooding of that area following Hurricane Agnes. Results of the interview of these individuals indicated that although many of the functions of a fallout shelter were performed in a natural disaster shelter, some critical ones were not. Furthermore, the environment in which these functions were performed was in no way similar to what would be expected of a fallout shelter situation in terms of availability of outside assistance, need for confinement, supply shortages, density of living, etc. Some management problems were abstracted from the natural disaster shelter setting, including management fatigue, information conflict and identification and control of volunteers.

Pub. Dec. 72: 55p., NTIS No. AD-759 842: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

**16.0080, SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS**

*E.R. BARTLEY, Tampa Bay Regional Plan. Coun., St. Petersburg, Florida*

Abstract: Contents: Sarasota's authority to zone; The existing Sarasota zoning code (The legislative context, the judicial context, the executive); District regulations; Special problems--treatment of non-conformities; The current Sarasota zoning code; The current Sarasota subdivision regulations.

Pub. Jan. 70: 185p., NTIS No. PB-195 647: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

**16.0081, A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS**

*UNKNOWN, Stephenson Co. Planning Comm., Freeport, Illinois 61032*

Abstract: The Stephenson County Comprehensive Plan is an integration of the plans of the local communities based upon the broad framework of a plan for the entire county including environmental factors, land utilization, highways, drainage, community facilities, recreation, and housing. Based upon an analysis of the data, the comprehensive plan includes recommendations for land use, thoroughfares, community facilities, public buildings and public utilities. The

Lake Lu-Aqua-Na State Park; development and re U.S. Route 20; development of a major park on Run Creek; and development of vacation housing.

Pub. Jul. 70: 341p., NTIS No. PB-193 922: HC \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban ment

**16.0082, CLIMATOLOGICAL ASSESSMENT OF EFFECTS ON PRECIPITATION - PART I**

*F.A. HUFF, State Water Survey, Urbana, Illinois 618*

Abstract: This is a two-year project involving ext matological analyses of urban effects on precipitat around eight major cities in central and easte States. Analyses were made initially of monthly ar precipitation within a radius of 50 to 75 miles of Diurnal rainfall distributions are discussed for Chicago, Cleveland, and Washington. Evidence was non-existent at Indianapolis, Tulsa, and New Orleans effects at Houston could be identified only in May-rainfall of air mass origin. The urban effect app more pronounced in summer than in winter and us imized 10-35 miles downwind of the central city had thunder increases ranging from 13 to 47 per the climatic background, and the maximum area c creases in hail ranged from 90 to 350 percent.

Pub. May 72: 39p., NTIS No. PB-228 7571: PC \$1.45.

SUPPORTED BY U.S. Natl. Science Foundation

**16.0083, ZONING ORDINANCE - KNOX COUNTY ANA**

*UNKNOWN, Clyde E. Williams & Assoc. Inc, Indiana diana*

Abstract: Standards and maps are presented for a unincorporated area of Knox County, Indiana.

Pub. Dec. 71: 150p., NTIS No. PB-206 088: PC \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban ment

**16.0084, ECONOMIC FACTORS AFFECTING CH THE INTENSITY OF FLOOD PLAIN USE**

*J.R. BARNARD, Iowa State University, Water Research Inst., Ames, Iowa 50010*

Abstract: The extent of agricultural land use chan floodplain of the Iowa River as a result of the buil Coralville Dam is examined. The dollar values from land use change are estimated and compa original project study estimates prepared by the C engineers. The study also analyzes the factors affecti change.

Pub. Dec. 71: 13p., NTIS No. PB-208 610: PC \$0.95.

SUPPORTED BY U.S. Dept. of Interior - O.W.R.T

**16.0085, AN ANALYSIS OF OPERATING SYSTE TIVENESS - FOCUS ON THE BEHAVIOR O COORDINATORS**

*C.T. GRIFIN, Iowa State University, School of Scie Iowa 50010*

**Abstract.** The study introduces and develops a theoretical and conceptual model of local coordinator response to disaster. Prediction and explanation of role performance following disaster was achieved by developing a causal model of disaster or operating system role performance. Path analysis techniques were applied to data from local coordinators in Minnesota, Iowa, Illinois and South Dakota who had experienced and responded to disasters. Considerable empirical support was obtained for hypotheses (model) stated in the form of generalizations. Relevant concepts included disaster, building and operating system role performance, organizational autonomy, uncertainty, role conflict, stress, prestige, communication, warning and need for information. Implications of the research for the training of coordinators and for future research are discussed.

Pub. Sep 72: 47p., NTIS No. AD-748 839: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0086, ROLE PERFORMANCE IN THE OPERATING SYSTEM - CIVIL DEFENSE OPERATIONS IN DISASTER

C.L. MULFORD, Iowa State University, School of Science, Ames, Iowa 50010

**Abstract.** The study introduces a conceptual model of coordinator response to disaster and investigates the response of local coordinators in Minnesota, Iowa, Illinois and South Dakota to disasters. A total 123 phone screening interviews and 59 personal interviews were completed during the study. Comparison of operational and non-operational disaster coordinators were made on a number of activities that might occur before as well as following a disaster. Responses of operational coordinators to personal interview items were presented in terms of concepts such as disaster, building and operating system role performance, organizational autonomy, uncertainty, role conflict, stress, prestige, communication, warning and need for information. Implications of the research for disaster operations, overall civil defense program, the training of coordinators and for future research were presented.

Pub. Mar. 72: 88p., NTIS No. AD-743 953: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0087, SECURING COMMUNITY RESOURCES FOR SOCIAL ACTION

C.L. MULFORD, Iowa State University, School of Science, Ames, Iowa 50010

**Abstract:** This report analyzes local civil preparedness organizational effectiveness. The report focuses on the nature of organizations as 'open system,' the characteristics of organizations as systems, the organization's external environment, and external 'resource-acquisition' strategies, both primary and auxiliary. The analysis examines the overall use of these strategies and their relationship to four groups of selected variables (organizational resources, characteristics of coordinators, characteristics of jurisdictions, and the environmental status of the organization).

general welfare by providing for a reasonable desirable comprehensive system or pattern of land use in unincorporated area of the county, by preventing incompatible land uses, by lessening street congestion, avoiding undue concentration of population, by preventing erosion of land, by securing safety from fires and other dangers, by providing adequate light and ventilation, facilitating the provision of public and private services where applicable, by implementing the Land Use and other elements of the county's Comprehensive Land Use and development.

Pub. Dec. 69: 93p., NTIS No. PB-192 700: PC \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0089, ZONING ORDINANCE - PAINTSVILLE, OHIO

UNKNOWN, State Program Dev. Office, Franklin, Ohio 43061

**Abstract:** The revision of the ordinance contains regulations for the control of mobile homes, flood plain areas, and townhouses. These regulations were extracted from the ordinance obtained from the Department of Health, Education and Welfare.

Pub. Jun. 71: 60p., NTIS No. PB-201 544: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0090, WEATHER MODIFICATION - FISCAL YEAR 1969, 1970, 1971

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic and Atmospheric Admin., Rockville, Maryland 20852

**Abstract:** The report summarizes the important findings in man's attempts to modify the weather that have taken place in the United States and abroad during the years of 1969, 1970, and 1971. The activities include observational and experimental studies in the laboratory. The weather phenomena include snowfall, hurricanes, tornadoes, hailstorms, and other weather events. The report also discusses the importance of weather modification in evaluating social, economic, legal, and ecological aspects. Weather modification is considered in addition to the technical aspects.

Pub. May 73: 172p., NTIS No. COM-73-50671/9: PC \$1.45.

SUPPORTED BY U.S. Dept. of Commerce - National Oceanic and Atmospheric Administration

#### 16.0091, CLIMATES OF THE STATES - CLIMATE DATA - NEW YORK

A.B. PACK, U.S. Dept. of Commerce, Natl. Oceanic and Atmospheric Admin., Silver Spring, Maryland 20910

**Abstract:** The data summary on the climate of the United States presents a brief physical description of the state and its descriptions of its general climatic features, its precipitation, snowfall, floods, winds and storms.

The meteorological, hydrological, and oceanographic operations of the National Weather Service are unique in nature and scope. The great variety of activities and their geographical dispersion creates a complex operating system. The purpose of this report is to summarize this system and place it in perspective.

The National Weather Service (NWS), under the National Oceanic and Atmospheric Administration, has a vast operating program. Its personnel are found at approximately 400 facilities within the 50 states and at 30 elsewhere. Altogether NWS has about 5,200 full-time employees working in meteorological, hydrological, and oceanographic operations. In 1 year, about 3.5 million observations are taken and 1.9 million forecasts and warnings issued. In addition, countless individual briefings and services are provided on a routine but unscheduled basis.

Within the framework of this report all of the operating functions and service programs of NWS are considered. Included are the meteorological program activities, the hydrologic forecast and service activities, as well as the oceanographic and climatological services. The Research and Development, Engineering and Technical Training areas are also described.

Appendices to this report include a listing of stations with identifiers, a tabular summary of facilities and service programs at each station, and a brief description of the administrative organization of NWS.

Pub. Oct. 73; 247p., U.S. Dept. Comm. NOAA, Nat. Weather Service, Silver Spring, Md.

Abstract provided by FDAA.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

#### 16.0093, RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969

J. BLACKWELL, State Dept. of Community Affs., Boston, Massachusetts 02202

Abstract: Contents: Authority, purposes and validity; Zoning districts and boundaries; General provisions; Non-conforming buildings and uses; Rural residence districts; Suburban residence districts; Village residence districts; Business districts; Highway business districts; Industrial districts; Flood plain districts; Earth materials removal; Board of appeals; Amendments; Enforcement.

Pub. Jun. 69; 50p., NTIS No. PB-194 552: HC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0094, COLLABORATIVE RESEARCH ON NATURAL HAZARDS

R.W. KATES, Clark University, Graduate School, Worcester, Massachusetts 01610

The collaborative program of natural hazard research seeks to understand the ways in which man perceives extreme natural events and adjust to their hazards, to apply this knowledge towards reducing the social cost of these events, and to extend such understandings to the new complex of man-made environmental risks. A basic research paradigm has been developed: for any natural hazard, the research sought to 1) assess the extent of human occupancy by hazard zones, 2) identify the full range of possible human adjustments to the hazard, 3) study how men perceive and estimate the occur-

program special attention is directed (1) to insights and strategies developed in previous hazards and to other cultural settings; and (2) to the existence of a 'Natural Hazard Syndrome' the similarities and differences in human adjustment to extreme geophysical events, biological hazards, environmental hazards, and common man-in modern society. Related to these major research the need for encouraging new investigators from other disciplines, developing new research and experimental methods, designing comparative studies, and preparing literature and research in new areas of investigation. This grant supports a three pronged effort at Clark University of Torrington.

SUPPORTED BY U.S. Natl. Science Foundation

#### 16.0095, COMPREHENSIVE PLAN - REORGANIZATION - VILLAGE OF EAST AURORA TOWN OF AURORA, N.Y.

UNKNOWN, Aurora Planning Board, Aurora, N.Y.

Abstract: The resultant Comprehensive Plan for the Village and Town of East Aurora, New York, includes proposed 1) a plan for the Village and Town; Street and Highway with emphasis on the reduction of through-traffic in residential neighborhoods in the village; a special relation of surface water drainage, public sewerage, and land forms and soil types, with a timetable for alternative plans for residential subdivision; and 2) a Facilities Plan with suggested park designs. The plan includes a section, in addition to its discussion and recommendations concerned with regulatory measures proposed amendments to the local zoning ordinance, a map which include a 'flood plain sector' and a 'conservation sector' in the town.

Pub. Jun. 70; 123p., NTIS No. PB-192 382: HC \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0096, THE CHARLOTTE CONSORTIUM FOR URBAN INFORMATION SYSTEMS - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM

UNKNOWN, Unknown Inst. or Indiv. Grant, North Carolina

Abstract: The report is from a USAC series project of Charlotte, North Carolina, covering systems analysis through implementation and urban information systems. It contains a functional analysis of municipal activities comprising the police, fire, and mental control, and disaster planning and control. Each is described in terms of hierarchical functions, components, and processes. Described by flow charts and text, with cross references related to other subsystems.

Pub. Feb. 71; 620p., NTIS No. PB-208 487-02: HC \$0.95.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0097, THE POLICE DEPARTMENT IN NATURAL DISASTER OPERATIONS

J.M. BROOKS, Ohio State University, Disaster Center, Columbus, Ohio 43210

Abstract: The report describes the involvement



sequences of these adaptations to the authority structure, the decision-making process, and channels of communication are discussed. The relationship of the police to other organizations in emergency action is also elaborated.

Pub. Sep. 69: 85p., NTIS No. AD-707 937: HC \$3.00 MF \$0.65.

SUPPORTED BY No Formal Support Reported

#### 16.0098, A PERSPECTIVE ON DISASTER PLANNING

R.R. DYNES, Ohio State University, Disaster Research Center, Columbus, Ohio 43210

Abstract: The report presents a perspective in disaster planning. The characteristics of disaster agents, and the kinds of demands and requirements they generate, are considered. This is followed by an examination of widely held misconceptions of how people and groups behave in disaster situations. A contrast is then made between community activities and processes in normal times and during emergencies. Next, the basic elements involved in the organized response of a community to a disaster are set forth. The report concludes with a systematic discussion of disaster planning, including weaknesses in typical disaster plans and strategies for bringing about community emergency planning.

Pub. Jun. 72: 98p., NTIS No. AD-750 293: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0099, THE WARNING SYSTEM IN DISASTER SITUATIONS - A SELECTIVE ANALYSIS

B.F. MCLUCKIE, Ohio State University, Disaster Research Center, Columbus, Ohio 43210

Abstract: In many ways warning can be the most important phase of the disaster response. Warning is thought of not just in terms of mechanical devices but in terms of psychological and sociological structures and processes. Warning is not only advance notification of the existence of danger but also information about what can be done to prevent, avoid, or minimize the danger. The characteristics of the disaster agent -- frequency, speed of onset, scope of impact, destructive potential, etc. -- affect the warning process. Before a warning message can be issued, threat data must be collected, collated, and evaluated. The report examines what is involved in these processes. Included among the factors influencing response are the socio-cultural framework, the historical setting, and the immediate ongoing social situation. The report contains a discussion of implications for nuclear catastrophe.

Pub. Jul. 70: 78p., NTIS No. AD-714 991: PC \$3.00 MF \$0.95.

SUPPORTED BY No Formal Support Reported

#### 16.0100, ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES

E.L. QUARANTELLI, Ohio State University, School of Social Science, Columbus, Ohio 43212

There are three related aspects of this study which will conclude this year. 1) Some field work will be done primarily to fill in gaps in our data on hospital emergency services, rumor control centers, emergent groups, and radio and television stations (and possibly human relations units in police departments). 2) Considerable more time will be spent on data analysis. In part, we will finish up the aforementioned studies for which new data are being gathered. But we will also be

articles are being finished to appear in a special issue of the *American Behavioral Scientist* devoted to 'Issues of Organizational Involvement and Control in Civil Disturbances.' About ten monographs will appear, especially on organizational responses to emergencies. The theoretical model developed in this five year research and dealing with similarities and differences in group activities in natural disturbances is to be detailed in a book.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & W.F. H.S.M.H.A

#### 16.0101, DISASTER RELIEF - DOMESTIC ACTION SPOTLIGHT

E.J. RUSII, U.S. Army, War College, Carlisle, Pa. 17013

Abstract: Disaster relief is examined as one of the major responsibilities of the U.S. Army, including Active Army, Army National Guard, and Army Reserve, to particularly demonstrate and enhance domestic action capabilities and thereby gain Congressional support. The examination is based on the devastation wrought in the Commonwealth of Massachusetts and the State of New York by Tropical Storm 'Dorothy' in 1972, and the disaster relief efforts of thousands of personnel from all three components following the storm to restore order out of chaos. Source documents include after action reports, letters, telegrams, memoranda, legal authorities, policy documents, and periodicals. The laws, regulations, and plans governing disaster relief are discussed. The devastation caused by the storm is followed by a detailed summary of the roles of the various units. Problems faced by the Secretary of Defense and the Commanding General, First U.S. Army, along with the decisions, which are then assessed. The lessons learned by the National Guard units are also presented.

Pub. Mar. 73: 80p., NTIS No. AD-761 041: PC \$3.00 MF \$0.95.

SUPPORTED BY U.S. Dept. of Defense - Army

#### 16.0102, MYRTLE BEACH, S.C. - COMMUNITY DEVELOPMENT PLAN

UNKNOWN, State Planning & Grants Div., Carolina

Abstract: A comprehensive development plan for Myrtle Beach relative to the economy, population, goals, and constraints, existing land use, future land use, and within the area defined as the Myrtle Beach Planning Area.

Pub. Apr. 70: 155p., NTIS No. PB-192 352: PC \$3.00 MF \$0.65.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

#### 16.0103, THE WICHITA FALLS CONSORTIUM REPORT - VOLUME III - ANALYSIS OF MULTIPLE ACTIVITIES - SECTION IV - PUBLIC SAFETY STUDIES

UNKNOWN, Unknown Inst. or Indiv. Grant, Texas

Abstract: The report is from a USAC series project in the City of Wichita Falls, covering activities from 1968 to 1972. The analysis is through implementation and evaluation of various public safety systems. The report discusses the public safety activities. It includes the results of a systems analysis of activities taking place in the Police Department.

\$0.95.  
SUPPORTED BY U.S. Dept. of Housing & Urban Development

**16.0104, ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COASTAL ZONE. GALVESTON-HOUSTON AREA**

*W.L. FISHER, Univ. of Texas, Bureau of Economic Geology, Austin, Texas 78712*

The Environmental Geologic Atlas of the Texas Coastal Zone, the product of more than 15 man-years of research and analysis at the Bureau of Economic Geology, The University of Texas at Austin, is designed to provide an urgently needed inventory for this area. The basic environmental geologic map delineates and depicts in detail resource units of first-order environmental significance. The accompanying series of eight special-use maps is designed for particular information needs. Included are physical properties and land-use suitability, current land use, active physical processes, mineral and energy resources, land and submerged land topographic and bathymetric configuration, natural and artificial water systems, and climate. Statistical tables define and inventory the more than 250 natural and cultural features of the Texas Coastal Zone. A descriptive text explains the data presented, their utility, and means of extrapolating for other special uses.

Pub. 1972: 91p., No copy info. available.

Abstract provided by FDAA.

SUPPORTED BY No Formal Support Reported

**16.0105, METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER**

*D.A. BROCK, Dallas Water Utilities Dept., Dallas, Texas*

Abstract: The study develops methodology for creation of a plan for operation of a metropolitan water system subsequent to nuclear attack or natural disaster. Automatic digital computer water system simulation is used to determine the ultimate overall effect of damage to specific components. Vulnerability analyses are made as a mathematical model of the water system reacts automatically to hypothetical attack data supplied by the National Civil Defense Computer Center. Problems of unmanned water purification plant operation are noted. The need for and availability of electric power is considered.

Pub. May 70: 381p., NTIS No. Ad-711 956: HC \$3.00 MF \$0.65.

SUPPORTED BY No Formal Support Reported

**16.0106, SOIL POLLUTION - EROSION EFFECTS IN SOIL UNKNOWN, U.S. Dept. of Defense, Defense Documentation Center, Alexandria, Virginia**

Abstract: The bibliography contains 291 unclassified and unlimited citations of reports on the presumably damaging effects of erosion on the regolith. Erosion by wind, water, ice, avalanches, landslides, earthquakes, helicopter rotor downwash, exhaust gases, and other forces is represented. Procedures for the protection, stabilization, preservation, and restoration of earth materials exposed to erosion are included. Corporate Author: Monitoring Agency, Subject, Title, and Personal Author indexes are provided.

Pub. Jul. 73: 390p., NTIS No. AD-763 500. PC \$9.00 MF \$1.45.

NAS  
*D.E. PAULEY, Gautney & Jones Comm. Inc., Virginia 22042*

Abstract: The objective of this study is to select desirable equipment that will enable broadcast the Defense Civil Preparedness Agency Radio Protection Program to rapidly restore broadcasting in the event of destruction of the regular antenna. Expedient antennas are proposed for AM and FM. Procurement specifications are presented. A study of the construction of expedient antennas from available materials is included.

Pub. Nov. 73: 126., NTIS No. AD-775 831/1: \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

**16.0108, AREA-WIDE DISASTER RESPONSE PREPAREDNESS AND REGIONAL COUNCILS**

*R.J. MARSHAK, Human Sciences Research Inc., Virginia 22101*

Abstract: The report is divided into three parts: the development of regional councils and the Process; a regional approach to preparedness organization which would allow the preparedness organization to utilize regional councils effectively; and planning requirements that would be posed by the organization, with an indication of how a regional preparation would support such a contingency planning. Major recommendations of the report include: development of a regional Collegium of Preparedness; the funding of a professional planner or advisor to work with the Collegium and regional councils; encouragement of regional councils to contact officials as part of the A-95 PNRS; the funding, area-wide comprehensive preparedness plans; the incorporation of crisis relocation planning within the comprehensive planning effort utilizing regional councils; and encouragement of multi-jurisdictional and multi-agency involvement.

Pub. Feb. 74: 204p., NTIS No. AD-776 382/4: \$1.45.

SUPPORTED BY U.S. Dept. of Defense - Army

**16.0109, BUILDING STANDARDS AND EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN**

*B. GONEN, Univ. of Washington, School of Engineering, Seattle, Washington 98105*

This report presents a historical record of the effects on structures of the two most recent earthquakes (1949 and 1965) in the Puget Sound area. It outlines the history and current state of building codes for earthquakes in the Puget Sound area, and describes regional activities that could aid material damage during future earthquakes in the Puget Sound area. The aim of this report is to provide a reference of regional information relevant for earthquake-resistant design in the Puget Sound Basin. Since structural effects are disassociated from ground effects, this study brackets the effects of soil, geological and seismological effects for the

The 1949 earthquake is discussed in Chapter 2, the 1965 earthquake in Chapter 3. The history of building code changes in building-code ordinances for earthquakes within the Puget Sound region for the period from 1900 through 1973 are reviewed in Chapter 4. The earthquake resistant design is discussed in Chapter 5.

Pub. May 74, 146p., Report SM 74-1; Div. of Structures & Mechanics, Dept. of Civil Engineering, Univ. of Wash., Seattle, Wash. 98195.

Abstract provided by FDAA.

SUPPORTED BY U.S. Natl. Science Foundation

# SUPPORTING AGENCY INDEX

Alabama State Government - Montgomery

5.0001, 6.0214.

Auburn University

6.0157.

California Inst. of Technology - Pasadena

3.0001, 3.0041, 3.0045, 3.0140, 3.0141, 3.0144.

California State Government - Sacramento

3.0046, 3.0150, 3.0151, 6.0044, 9.0006.

Chicago City Government - Illinois

6.0083.

Colorado State University - Fort Collins

6.0190.

Florida State Government - Tallahassee

6.0232, 10.0028, 15.0016.

Illinois State Government - Springfield

2.0011, 6.0084, 6.0263, 9.0011, 12.0017, 12.0033,  
12.0034, 15.0020.

Iowa State Government - Des Moines

6.0064.

Kentucky State Government - Frankfort

9.0015.

Los Angeles County Government - California

3.0004.

Michigan State Government - Lansing

9.0016.

Mississippi Res. & Dev. Center - Jackson

6.0309.

Montana State University - Bozeman

6.0125.

Natl. Academy of Sciences - Washington

3.0054, 3.0186, 5.0009, 9.0010, 16.0063, 16.0064,  
16.0065.

Natl. Concrete & Masonry Assn. - Arlington

3.0193.

Nevada State Government - Carson City

2.0017.

New Jersey State Government - Trenton

6.0323.

New York Ocean Sci. Lab. - Montauk, N.Y.

15.0028.

New York State Government - Albany

6.0130, 6.0337.

No Formal Support Reported

3.0048, 3.0094, 3.0101, 3.0244, 3.0256, 3.0270, 6.0016,  
6.0035, 6.0052, 6.0170, 6.0177, 6.0229, 6.0299, 8.0026,  
16.0001, 16.0004, 16.0017, 16.0019, 16.0036, 16.0039,  
16.0040, 16.0041, 16.0076, 16.0097, 16.0099, 16.0104,  
16.0105.

North Dakota State Government - Bismarck

2.0020.

Ohio State Government - Columbus

6.0347, 6.0348, 9.0057, 9.0059, 15.0030, 15.0031,  
15.0032, 16.0016.

Ohio State University

R. W. Johnson Found. - New Brunswick, N.J.

16.0029.

Riverside County Govt. - Cal.

6.0042.

Salt Lake County Government - Utah

6.0031.

Texas A. & M. University System

16.0024.

Texas State Government - Austin

6.0388.

Texas Technological University - Lubbock

12.0002.

U.S. Atomic Energy Commission

3.0013, 3.0014, 3.0015, 3.0017, 3.0018, 3.0056, 3.0072,  
3.0154, 3.0220, 3.0222, 3.0223, 3.0224, 3.0225, 3.0245,  
3.0246, 3.0247, 3.0262, 3.0265, 3.0271, 3.0272, 3.0278,  
7.0017.

U.S. Dept. of Agriculture

1.0012, 5.0003, 5.0004, 5.0005, 5.0010, 5.0015, 5.0016,  
5.0028, 5.0033, 5.0034, 5.0035, 5.0036, 5.0037, 5.0038,  
5.0039, 5.0045, 6.0055, 6.0195, 6.0196, 6.0197, 6.0198,  
6.0199, 6.0200, 6.0201, 6.0202, 6.0203, 6.0204, 6.0205,  
6.0206, 9.0024, 9.0062, 15.0034.

U.S. Dept. of Agriculture - C.S.R.S.

2.0022, 5.0047, 6.0085, 6.0265, 6.0336, 7.0004, 7.0006,  
16.0021.

U.S. Dept. of Agriculture - E.R.S.

6.0194, 7.0001, 7.0002, 7.0005.

U.S. Dept. of Agriculture - F.S.

1.0011, 5.0002, 5.0006, 5.0007, 5.0011, 5.0014, 5.0017,  
5.0018, 5.0019, 5.0020, 5.0025, 5.0027, 5.0040, 5.0042,  
5.0043, 5.0046, 6.0041, 15.0002.

U.S. Dept. of Commerce - E.S.S.A.

6.0057, 12.0038, 16.0043.

U.S. Dept. of Commerce - Econ. Dev. Admin.

8.0011, 8.0012.

U.S. Dept. of Commerce - Maritime Admin.

8.0076.

U.S. Dept. of Commerce - N.B.S.

3.0055, 3.0188, 3.0190, 3.0191, 3.0194, 3.0195, 6.0001,  
8.0074, 8.0077, 8.0078, 12.0001, 12.0004, 16.0030,  
16.0073.

U.S. Dept. of Commerce - N.O.A.A.

2.0003, 2.0005, 2.0010, 2.0013, 2.0019, 2.0021, 2.0024,  
3.0002, 3.0019, 3.0024, 3.0025, 3.0049, 3.0155, 3.0156,  
3.0157, 3.0159, 3.0160, 3.0219, 3.0221, 3.0235, 3.0237,  
3.0238, 3.0259, 3.0275, 5.0029, 5.0031, 6.0006, 6.0021,  
6.0022, 6.0036, 6.0056, 6.0070, 6.0081, 6.0103, 6.0104,  
6.0182, 6.0207, 6.0289, 6.0290, 6.0341, 6.0359, 6.0391,  
7.0012, 7.0016, 8.0002, 8.0004, 8.0005, 8.0007, 8.0016,  
8.0020, 8.0021, 8.0022, 8.0023, 8.0029, 8.0057, 8.0058,  
8.0059, 8.0060, 8.0061, 8.0062, 8.0063, 8.0064, 8.0065,  
8.0066, 8.0068, 8.0069, 8.0075, 8.0084, 8.0085, 8.0086,  
8.0087, 8.0088, 8.0089, 8.0090, 8.0091, 8.0092, 8.0093,

12.0016, 12.0020, 12.0021, 12.0022, 12.0023, 12.0024,  
12.0025, 12.0026, 12.0027, 12.0028, 12.0030, 12.0031,  
12.0036, 12.0037, 12.0039, 12.0041, 13.0004, 13.0005,  
13.0007, 13.0008, 13.0020, 13.0022, 13.0023, 13.0024,  
13.0025, 15.0001, 15.0017, 15.0026, 15.0027, 15.0029,  
15.0036, 16.0045, 16.0046, 16.0066, 16.0067, 16.0068,  
16.0069, 16.0070, 16.0071, 16.0072, 16.0090, 16.0091,  
16.0092.

U.S. Dept. of Defense - Air Force

3.0070, 3.0145, 3.0146, 3.0239, 3.0241, 3.0248, 3.0249,  
3.0250, 3.0258, 5.0030, 8.0071, 9.0017, 9.0056, 12.0003,  
12.0029.

U.S. Dept. of Defense - Army

1.0004, 1.0007, 1.0013, 3.0005, 3.0031, 3.0034, 3.0036,  
3.0065, 3.0066, 3.0067, 3.0074, 3.0187, 3.0203, 3.0217,  
3.0232, 3.0233, 3.0234, 3.0242, 3.0254, 3.0267, 4.0002,  
4.0003, 5.0023, 6.0017, 6.0032, 6.0033, 6.0037, 6.0038,  
6.0053, 6.0054, 6.0086, 6.0095, 6.0096, 6.0097, 6.0098,  
6.0099, 6.0100, 6.0101, 6.0108, 6.0109, 6.0110, 6.0111,  
6.0116, 6.0117, 6.0118, 6.0119, 6.0120, 6.0121, 6.0141,  
6.0142, 6.0152, 6.0167, 6.0172, 6.0173, 6.0174, 6.0247,  
6.0257, 6.0312, 6.0313, 6.0314, 6.0315, 6.0320, 6.0358,  
6.0405, 8.0003, 8.0013, 8.0014, 8.0017, 8.0019, 8.0025,  
8.0028, 8.0030, 8.0031, 8.0032, 8.0033, 8.0034, 8.0035,  
8.0036, 8.0037, 8.0038, 8.0039, 8.0040, 8.0041, 8.0042,  
8.0043, 8.0044, 8.0045, 8.0046, 8.0047, 8.0048, 8.0049,  
8.0050, 8.0051, 8.0055, 8.0056, 8.0072, 8.0073, 8.0119,  
8.0134, 9.0003, 9.0021, 9.0054, 10.0009, 10.0010,  
10.0030, 12.0040, 13.0001, 13.0009, 13.0010, 13.0019,  
13.0026, 13.0027, 13.0028, 13.0029, 15.0004, 15.0006,  
15.0007, 15.0009, 15.0010, 15.0011, 15.0015, 15.0019,  
15.0021, 16.0007, 16.0008, 16.0026, 16.0027, 16.0033,  
16.0037, 16.0044, 16.0049, 16.0052, 16.0053, 16.0057,  
16.0059, 16.0060, 16.0078, 16.0079, 16.0085, 16.0086,  
16.0087, 16.0098, 16.0101, 16.0107, 16.0108.

U.S. Dept. of Defense - D.A.R.P.A.

3.0104, 3.0263, 8.0054.

U.S. Dept. of Defense - D.S.A.

16.0106.

U.S. Dept. of Defense - Navy

2.0014, 3.0007, 3.0044, 3.0058, 3.0080, 5.0012, 8.0008,  
8.0052, 8.0053, 8.0070, 8.0080, 8.0081, 8.0082, 8.0103,  
8.0117, 8.0118, 8.0121, 8.0136, 9.0004, 9.0036, 9.0063,  
10.0002, 10.0025, 13.0002, 13.0016, 15.0014, 15.0022,  
15.0024, 15.0025, 16.0010.

U.S. Dept. of Hlth. Ed. & Wel.

6.0014, 6.0398.

U.S. Dept. of Hlth. Ed. & Wel. - A.D.M.H.A.

6.0003, 16.0020.

U.S. Dept. of Hlth. Ed. & Wel. - H.S.M.H.A.

6.0008, 6.0009, 6.0010, 6.0011, 16.0002, 16.0006,  
16.0011, 16.0018, 16.0100.

U.S. Dept. of Housing & Urban Development

1.0003, 2.0002, 3.0011, 3.0021, 3.0047, 3.0069, 3.0149,  
3.0158, 3.0162, 3.0196, 3.0218, 3.0269, 3.0284, 4.0001,  
5.0026, 6.0002, 6.0005, 6.0024, 6.0025, 6.0026, 6.0027,  
6.0028, 6.0029, 6.0045, 6.0046, 6.0047, 6.0072, 6.0087,  
6.0127, 6.0128, 6.0133, 6.0148, 6.0158, 6.0159, 6.0160,  
6.0178, 6.0179, 6.0181, 6.0192, 6.0231, 6.0236, 6.0245,  
6.0253, 6.0258, 6.0260, 6.0262, 6.0268, 6.0283, 6.0284,  
6.0286, 6.0295, 6.0307, 6.0308, 6.0329, 6.0330, 6.0332,  
6.0333, 6.0340, 6.0352, 6.0354, 6.0362, 6.0363, 6.0369,  
6.0380, 6.0381, 6.0385, 7.0009, 8.0001, 8.0010, 8.0015,  
8.0018, 8.0079, 9.0007, 9.0026, 10.0003, 10.0033,  
11.0001, 12.0006, 12.0011, 13.0003, 14.0001, 14.0003.

U.S. Dept. of Interior - Bu. Reclamation

1.0008, 2.0006, 2.0008, 2.0009, 2.0012, 3.0053,  
3.0173, 3.0183, 4.0007, 6.0171, 6.0183, 9.0008, 9.

U.S. Dept. of Interior - Bureau of Mines

6.0015, 6.0040, 9.0009, 10.0005, 10.0006,  
10.0022, 10.0023, 10.0024.

U.S. Dept. of Interior - Geological Survey

1.0010, 2.0018, 3.0006, 3.0020, 3.0039, 3.0050,  
3.0052, 3.0057, 3.0100, 3.0105, 3.0106, 3.0107,  
3.0109, 3.0110, 3.0111, 3.0112, 3.0113, 3.0114,  
3.0116, 3.0117, 3.0118, 3.0119, 3.0120, 3.0121,  
3.0123, 3.0124, 3.0125, 3.0126, 3.0127, 3.0128,  
3.0130, 3.0131, 3.0132, 3.0133, 3.0134, 3.0135,  
3.0164, 3.0165, 3.0166, 3.0167, 3.0168, 3.0169,  
3.0172, 3.0174, 3.0175, 3.0176, 3.0177, 3.0178,  
3.0180, 3.0181, 3.0182, 3.0184, 3.0185, 3.0197,  
3.0243, 4.0004, 4.0005, 4.0006, 6.0020, 6.0023,  
6.0039, 6.0048, 6.0049, 6.0058, 6.0062, 6.0063,  
6.0068, 6.0069, 6.0071, 6.0075, 6.0079, 6.0082,  
6.0091, 6.0093, 6.0094, 6.0102, 6.0106, 6.0114,  
6.0129, 6.0134, 6.0135, 6.0136, 6.0138, 6.0139,  
6.0143, 6.0147, 6.0149, 6.0156, 6.0161, 6.0164,  
6.0168, 6.0169, 6.0176, 6.0180, 6.0184, 6.0185,  
6.0187, 6.0188, 6.0193, 6.0210, 6.0211, 6.0215,  
6.0220, 6.0221, 6.0230, 6.0233, 6.0234, 6.0244,  
6.0249, 6.0250, 6.0251, 6.0254, 6.0255, 6.0256,  
6.0274, 6.0275, 6.0276, 6.0277, 6.0278, 6.0279,  
6.0281, 6.0282, 6.0287, 6.0296, 6.0297, 6.0303,  
6.0305, 6.0310, 6.0311, 6.0316, 6.0317, 6.0318,  
6.0325, 6.0326, 6.0331, 6.0342, 6.0343, 6.0344,  
6.0357, 6.0364, 6.0365, 6.0366, 6.0370, 6.0371,  
6.0373, 6.0374, 6.0375, 6.0376, 6.0377, 6.0382,  
6.0384, 6.0386, 6.0389, 6.0392, 6.0394, 6.0395,  
6.0401, 6.0403, 6.0404, 6.0407, 6.0408, 6.0409,  
6.0415, 8.0027, 8.0133, 9.0001, 9.0002, 9.0027,  
9.0029, 9.0030, 9.0031, 9.0032, 9.0033, 9.0034,  
9.0041, 9.0042, 9.0043, 9.0044, 9.0045, 9.0046,  
9.0049, 10.0004, 10.0011, 10.0012, 10.0013,  
10.0016, 10.0017, 10.0018, 10.0019, 10.0020,  
10.0029, 13.0011, 13.0013, 13.0014, 13.0017,  
14.0002, 14.0004, 14.0006, 14.0007, 14.0008,  
14.0011, 14.0012, 14.0013, 14.0014, 15.0013,  
15.0037, 15.0039, 16.0054, 16.0055, 16.0056,  
16.0075.

U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0015, 2.0023, 3.0102, 6.0013, 6.0018, 6.0073,  
6.0076, 6.0113, 6.0137, 6.0144, 6.0153, 6.0154,  
6.0166, 6.0175, 6.0191, 6.0238, 6.0246, 6.0267,  
6.0291, 6.0292, 6.0293, 6.0306, 6.0322, 6.0334,  
6.0360, 6.0378, 6.0406, 10.0001, 14.0015,  
15.0033, 15.0038.

U.S. Dept. of Interior - O.W.R.T.

2.0001, 2.0016, 5.0022, 5.0044, 6.0004, 6.0007,  
6.0051, 6.0066, 6.0078, 6.0080, 6.0088, 6.0089,  
6.0105, 6.0107, 6.0122, 6.0123, 6.0124, 6.0126,  
6.0132, 6.0146, 6.0150, 6.0151, 6.0237, 6.0239,  
6.0241, 6.0242, 6.0243, 6.0266, 6.0269, 6.0270,  
6.0273, 6.0285, 6.0288, 6.0294, 6.0300, 6.0301,  
6.0321, 6.0324, 6.0328, 6.0335, 6.0338, 6.0339,  
6.0353, 6.0355, 6.0361, 6.0379, 6.0387, 6.0390,  
6.0397, 6.0399, 6.0410, 6.0411, 6.0412, 6.0413,  
10.0008, 13.0006, 15.0008, 16.0084.

U.S. Dept. of Justice

16.0042.

# SUPPORTING AGENCY INDEX

U.S. Dept. of Transportation - Coast Guard  
8.0006, 16.0009, 16.0015.

U.S. Dept. of Transportation - F.H.A.

1.0014, 3.0010, 3.0012, 3.0086, 3.0152, 3.0204, 6.0043,  
6.0050, 6.0059, 6.0060, 6.0061, 6.0065, 6.0145, 6.0155,  
6.0208, 6.0212, 6.0213, 6.0216, 6.0217, 6.0219, 6.0222,  
6.0327, 6.0356, 9.0005, 9.0013, 9.0014, 9.0019, 9.0037,  
9.0038, 9.0039, 9.0061, 10.0014, 10.0027, 10.0031,  
11.0002, 16.0012, 16.0013, 16.0014, 16.0031, 16.0035.

U.S. Dept. of Transportation - N.H.T.S.A  
16.0003

U.S. Dept. of Transportation - N.T.S.B.  
3.0199.

U.S. Dept. of Transportation - Off. Sec.  
9.0018, 9.0022, 16.0032

U.S. Dept. of Transportation - U.M.T.A.  
16.0034.

U.S. Environ. Protect. Agency - O.R.M.  
6.0112.

U.S. Executive Office - O.E.P.  
3.0022, 3.0161, 16.0077.

U.S. Executive Office - O.S.T.  
3.0200.

U.S. Natl. Aero. & Space Adm.

1.0009, 3.0071, 3.0266, 3.0274, 5.0013, 5.0032, 6.0030,  
6.0209, 6.0298, 6.0393, 8.0024, 8.0083, 8.0104, 8.0122,  
9.0035, 9.0050, 14.0009, 15.0005, 16.0047, 16.0048.

U.S. Natl. Science Foundation

1.0005, 2.0004, 3.0008, 3.0009, 3.0016, 3.0023, 3.0026,  
3.0027, 3.0028, 3.0032, 3.0037, 3.0038, 3.0040, 3.0042,  
3.0043, 3.0060, 3.0061, 3.0062, 3.0063, 3.0064, 3.0068,  
3.0075, 3.0078, 3.0079, 3.0087, 3.0090, 3.0103, 3.0136,  
3.0137, 3.0138, 3.0139, 3.0142, 3.0143, 3.0147, 3.0148,  
3.0153, 3.0192, 3.0202, 3.0205, 3.0206, 3.0208, 3.0210,  
3.0211, 3.0212, 3.0214, 3.0215, 3.0216, 3.0226, 3.0227,  
3.0228, 3.0229, 3.0230, 3.0231, 3.0236, 3.0240, 3.0251,  
3.0252, 3.0253, 3.0255, 3.0257, 3.0260, 3.0261, 3.0264,

3.0268, 3.0273, 3.0276, 3.0277, 3.0279, 3.0  
3.0282, 3.0283, 4.0008, 5.0008, 5.0021, 5.0  
6.0252, 6.0259, 7.0003, 7.0007, 7.0008, 7.0  
7.0013, 7.0014, 7.0015, 7.0018, 8.0009, 8.0  
8.0099, 8.0102, 8.0120, 8.0125, 8.0135, 8.0  
9.0020, 9.0025, 9.0051, 9.0052, 9.0055, 9.00  
10.0032, 11.0007, 12.0018, 12.0019, 12.00  
13.0015, 13.0021, 14.0005, 14.0016, 15.00  
16.0022, 16.0028, 16.0061, 16.0062, 16.00  
16.0109.

U.S. Tennessee Valley Auth.

6.0367, 6.0368.

U.S. Veterans Administration

3.0189, 3.0201.

U.S. Water Resources Council - Wash., D.C.

6.0223, 6.0224, 6.0225, 6.0226, 6.0227, 6.0228.

University of Alabama

6.0162.

University of California

3.0003, 3.0029, 3.0030, 3.0033, 3.0035, 3.0  
3.0077, 3.0081, 3.0082, 3.0083, 3.0084, 3.0  
3.0089, 3.0091, 3.0092, 3.0093, 3.0095, 3.0  
3.0098, 3.0099.

University of Hawaii

6.0077.

University of Illinois

3.0059, 3.0207, 3.0209, 3.0213, 6.0264, 8.0  
12.0035.

University of Southern Miss. - Hattiesburg

4.0009.

University of Texas

9.0023.

Virginia Polytechnic Inst. - Blacksburg

6.0012.

Washington State Government - Olympia

1.0001, 1.0002, 1.0006, 6.0402

Wyoming State Government - Cheyenne

6.0189, 11.0008.

## SUPPORTING ORGANIZATION ADDRESSES

This list provides more complete address information of supporting organizations than appears for each project in the Disaster Types section.

Alabama State Government  
Montgomery, AL 36104

Auburn University at Montgomery  
Atlanta Highway  
Montgomery, AL 36109

California Institute of Technology  
Pasadena, CA 91109

California State Government  
State Capitol  
Tenth at L, North  
Sacramento, CA 95814

Chicago City Government  
City Hall  
121 N LaSalle Street  
Chicago, IL 60602

Colorado State University  
Fort Collins, CO 80521

Florida State Government  
Tallahassee, FL 32301

Illinois State Government  
State Capitol  
State Capitol Complex  
Springfield, IL 62706

Iowa State Government  
Des Moines, IA 50318

Kentucky State Government  
Frankfort, KY 40601

Los Angeles County Government  
City Hall  
200 N. Spring Street  
Los Angeles, CA 90012

Michigan State Government

Mississippi R&D Center  
Jackson, MS 39205

Montana State University  
Bozeman, MT 59715

National Academy of Sciences  
2101 Constitution Avenue, N.W.  
Washington, DC 20418

National Concrete & Masonry  
Association  
1800 N. Kent Street  
Arlington, VA 22209

Nevada State Government  
Carson City, NV 89701

New Jersey State Government  
Trenton City Hall  
East State Street  
Trenton, NJ 08608

New York Ocean Science  
Laboratory  
Montauk, NY 11954

New York State Government  
New York State Attorney General  
Capitol  
Albany, NY 12224

North Dakota State Government  
Bismark, ND 58501

Ohio State Government  
State Office Building  
65 S Front Street  
Columbus, OH 43215

Ohio State University  
400 Lincoln Tower  
Columbus, OH 43210

Pennsylvania State University  
201 Old Main  
University Park, PA 16802

R. W. Johnson Foundation  
New Brunswick, NJ 08902

Riverside County Government  
Court House  
4050 Main Street  
Riverside, CA 92501

Salt Lake City Government  
Salt Lake, City UT 84101

Texas A&M University System  
College Station, TX 77843

Texas State Government  
U.S. Courthouse  
200 W. 8th Street  
Austin, TX 78701

Texas Technological University  
Lubbock, TX 79409

U.S. Atomic Energy Commission  
Office of Information Services  
Washington, DC 20545

U.S. Department of Agriculture  
14th & Independence Avenue, S  
Washington, DC 20250

U.S. Department of Agriculture  
Cooperative State Research Ser  
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*M. MARTINELLI*, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta.

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#### 1.0007 PUGET PEAK AVALANCHE, ALASKA

*M.C. HOYER*, Arizona State University, School of Liberal Arts

#### 1.0013 SNOW PACK STABILITY INDICES RELATIVE TO THE CLIMAX AVALANCHE

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*J.T. ALFORE*, State Div. of Mines & Geology

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*E. LACHAPPELLE*, State Dept. of Highways

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*E.R. LACHAPPELLE*, Univ. of Washington, School of Arts

#### 1.0006 AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT

*E.R. LACHAPPELLE*, State Dept. of Highways

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EARTHQUAKES

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**3.0140 EARTHQUAKES AND INSURANCE - ERA CONFERENCE 2-3 APRIL, 1973**

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*K.V. STEINBRUGGE*, State Legislature

**3.0151 THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY**

*UNKNOWN*, State Legislature

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**3.0101 RECOMMENDATIONS DEVELOPED FROM REPORTS OF THE EARTHQUAKE COMMISSION AND EARTHQUAKE TASK FORCES - SAN FERNANDO EARTHQUAKE (ABBREV)**

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**3.0256 COMPILATION OF BRITTLE STRUCTURES WITHIN NEW YORK STATE**

*Y.W. ISACHSEN*, State Dept. of Education

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#### U.S. DEPT. OF DEFENSE - ARMY

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### 3.0203 EARTHQUAKE EFFECTS ON STRUCTURES

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*C.C. CALHOUN*, U.S. Army, Waterways Experiment Station

### 3.0233 STATE-OF-THE-ART FOR ANALYSIS OF EARTHQUAKE HAZARDS IN THE UNITED STATES - REPORT I

*O.W. NUTTLI*, U.S. Army, Waterways Experiment Station

### 3.0234 LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING

*F.C. TOWNSEND*, U.S. Army, Waterways Experiment Station

### 3.0242 MERAMEC PARK LAKE, UPPER MERAMEC RIVER BASIN, MERAMEC RIVER, MISSOURI

*UNKNOWN*, U.S. Army, Engineer District

### 3.0254 SEISMIC DESIGN OF BUILDING STRUCTURES

*J.T. YAO*, Univ. of New Mexico, Graduate School

### 3.0267 LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON

*UNKNOWN*, U.S. Army, Engineer District

#### U.S. DEPT. OF DEFENSE - D.A.R.P.A.

### 3.0104 MICROEARTHQUAKE MONITORING IN THE GELES AREA

*T. TENG*, Univ. of Southern California, School of Engineering

### 3.0263 TECTONIC STRESS IN THE EASTERN UNITED STATES - SEISMIC METHODS

*M. WYSS*, Columbia University, Lamont Doherty Geol. Observ.

- TO SELECTED U.S. NAVY INSTALLATIONS  
J.B. SEED, Calif. Inst. of Technology, Graduate School
- 3.0058 QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES  
G. ESTRADURIBE, Univ. of Illinois, School of Engineering
- 3.0080 SEISMICITY OF MENDOCINO ESCARPMENT - GORDA RIDGE REGION - CALIFORNIA  
E.G. KEITH, Univ. of California, Seismographic Station

#### U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT

- 3.0011 URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)  
UNKNOWN, State Div. of Mines & Geology
- 3.0021 PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971  
F.E. MCCLURE, U.S. Dept. of Hou. & Urb. Dev., Off. of Policy Dev. & Res.
- 3.0047 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)  
J.T. ALFORE, State Div. of Mines & Geology
- 3.0069 REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL REPORT  
UNKNOWN, Mississippi Ark. Tenn. Council
- 3.0149 THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN  
D. ARMSTRONG, Tri Cities Seismic Safe. Study
- 3.0158 FHA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH-RISE BUILDINGS  
R.W. CLOUGH, T.Y. Lin & Associates
- 3.0162 A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA  
UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories
- 3.0196 REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965  
UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Fed. Insurance Administration
- 3.0218 RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION  
S.T. ALGERMISSEN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.
- 3.0269 EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE  
F. KELLOGG, Mississippi Ark. Tenn. Council
- 3.0284 DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING  
UNKNOWN, Unknown Inst. or Indiv. Grant

3.0059 DYNAMIC RESPONSE OF MONTICELLO DAM  
L.H. ROEHM, U.S. Dept. of the Interior, Bureau of Reclamation

- 3.0171 EARTH AND ROCKFILL DAM DESIGN TECHNIQUES  
L.M. CHRISTIANSEN, U.S. Dept. of the Interior, Bureau of Reclamation
- 3.0173 EARTHQUAKES AND ACTIVE FAULTS  
J.S. DODD, U.S. Dept. of the Interior, Bureau of Reclamation

- 3.0183 EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE  
D.A. TIEDEMANN, U.S. Dept. of the Interior, Bureau of Reclamation

#### U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY

- 3.0006 VAN NORMAN RESERVOIRS AREA, CALIFORNIA  
R.F. YERKES, U.S. Dept. of the Interior, Geological Survey
- 3.0020 SEISMIC RISK - FDAA - WASHINGTON, D.C. - UTAH  
S.T. ALGERMISSEN, U.S. Dept. of the Interior, Geological Survey
- 3.0039 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA  
T.W. DIBBLEE, U.S. Dept. of the Interior, Geological Survey
- 3.0050 TETON DAM SEISMICITY - IDAHO  
W.V. MICKEY, U.S. Dept. of the Interior, Geological Survey
- 3.0051 NATIONAL EARTHQUAKE INFORMATION SERVICE  
A.C. TARR, U.S. Dept. of the Interior, Geological Survey
- 3.0052 COAL MINE DEFORMATION STUDIES, SOUTHWEST, COLORADO  
C.R. DUNRUD, U.S. Dept. of the Interior, Geological Survey
- 3.0057 HAWAIIAN VOLCANO OBSERVATORY  
D.W. PETERSON, U.S. Dept. of the Interior, Geological Survey
- 3.0100 RECONNAISSANCE STUDY OF RECOVERED GROUND WATER  
L.C. DUTCHER, U.S. Dept. of the Interior, Geological Survey
- 3.0105 RELATIVE ACTIVITY OF MULTIPLE STRANDS - CALIFORNIA  
M.G. BONILLA, U.S. Dept. of the Interior, Geological Survey
- 3.0106 SANTA CRUZ COUNTY COOP  
E.E. BRABB, U.S. Dept. of the Interior, Geological Survey
- 3.0107 EARTHQUAKE HAZARD REDUCTION - FRANCISCO BAY REGION  
E.E. BRABB, U.S. Dept. of the Interior, Geological Survey
- 3.0108 REGIONAL GEOLOGICAL FRAMEWORK - NORTH CENTRAL SAN ANDREAS FAULT - CALIFORNIA  
E.E. BRABB, U.S. Dept. of the Interior, Geological Survey

- 3.0109 ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA**  
*E.E. BRABB*, U.S. Dept. of the Interior, Geological Survey
- 3.0110 FAULT ZONE TECTONICS (CREEP) - CALIFORNIA**  
*R.O. BURFORD*, U.S. Dept. of the Interior, Geological Survey
- 3.0111 SAN ANDREAS FAULT - CALIFORNIA COOP**  
*M.M. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 3.0112 SOUTHERN CALIFORNIA TECTONICS**  
*M.M. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 3.0113 REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF BORREGO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 - CALIFORNIA (ABBREV)**  
*M.M. CLARK*, U.S. Dept. of the Interior, Geological Survey
- 3.0114 EARTHQUAKE MODELING**  
*J.H. DIETERICH*, U.S. Dept. of the Interior, Geological Survey
- 3.0115 EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA**  
*J.H. DIETERICH*, U.S. Dept. of the Interior, Geological Survey
- 3.0116 MONTEREY BAY - CALIFORNIA**  
*H.G. GREENE*, U.S. Dept. of the Interior, Geological Survey
- 3.0117 INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA**  
*M.J. JOHNSTON*, U.S. Dept. of the Interior, Geological Survey
- 3.0118 ENGINEERING SEISMOLOGY - CALIFORNIA**  
*W.B. JOYNER*, U.S. Dept. of the Interior, Geological Survey
- 3.0119 MICROEARTHQUAKE DATA ANALYSIS**  
*W.H. LEE*, U.S. Dept. of the Interior, Geological Survey
- 3.0120 MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA**  
*D.S. MCCULLOCH*, U.S. Dept. of the Interior, Geological Survey
- 3.0121 PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA**  
*E.H. PAMPEYAN*, U.S. Dept. of the Interior, Geological Survey
- 3.0122 ALASKA GEOLOGIC EARTHQUAKE HAZARDS**  
*G. PLAFKER*, U.S. Dept. of the Interior, Geological Survey
- 3.0123 RANGELY - CALIFORNIA**  
*C.B. RALEIGH*, U.S. Dept. of the Interior, Geological Survey
- 3.0124 REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA**  
*S.L. ROBBINS*, U.S. Dept. of the Interior, Geological Survey
- 3.0125 SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS**
- 3.0127 CRUSTAL STRAIN - CALIFORNIA, MONTANA, UTAH AND NEW MEXICO**  
*J.C. SAVAGE*, U.S. Dept. of the Interior, Geological Survey
- 3.0128 EARTHQUAKE HAZARDS RECONSTRUCTION NORTHWEST AND GEOLOGY OF NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON**  
*P.D. SNAVELY*, U.S. Dept. of the Interior, Geological Survey
- 3.0129 AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA**  
*S.W. STEWART*, U.S. Dept. of the Interior, Geological Survey
- 3.0130 SEISMIC SOURCE STUDIES - CALIFORNIA**  
*B. THATCHER*, U.S. Dept. of the Interior, Geological Survey
- 3.0131 TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA**  
*R. VONHUNE*, U.S. Dept. of the Interior, Geological Survey
- 3.0132 ACTIVE FAULTS AND GEOLOGIC HISTORY FROM PT. MUGU TO WILMINGTON, CALIFORNIA**  
*H.C. WAGNER*, U.S. Dept. of the Interior, Geological Survey
- 3.0133 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA**  
*R.E. WALLACE*, U.S. Dept. of the Interior, Geological Survey
- 3.0134 CALIFORNIA M/EQ NET**  
*R.L. WESSON*, U.S. Dept. of the Interior, Geological Survey
- 3.0135 CENTRAL CALIFORNIA SEISMICITY STUDY - CALIFORNIA**  
*R.L. WESSON*, U.S. Dept. of the Interior, Geological Survey
- 3.0163 RISK MAPS AND FIELD INVESTIGATION OF EARTHQUAKES - CALIFORNIA**  
*S.T. ALGERMISSEN*, U.S. Dept. of the Interior, Geological Survey
- 3.0164 SEISMIC RISK CORPS OF ENGINEERS, DISTRICT OF COLUMBIA, UNITED STATES**  
*W.W. HAYS*, U.S. Dept. of the Interior, Geological Survey
- 3.0165 VA. SEISMICITY - 32 STATES AND DISTRICT OF COLUMBIA**  
*W.P. MICKEY*, U.S. Dept. of the Interior, Geological Survey
- 3.0166 GLEN CANYON AND AUBURN DAMS - COLORADO**  
*W.P. MICKEY*, U.S. Dept. of the Interior, Geological Survey
- 3.0167 SEISMICITY AND EARTH STRUCTURE - CALIFORNIA**  
*J. TAGGART*, U.S. Dept. of the Interior, Geological Survey
- 3.0168 SOUTH CAROLINA SEISMICITY PROGRAM**  
*A.C. TARR*, U.S. Dept. of the Interior, Geological Survey
- 3.0169 SOCORRO 2 DEGREE QUADRANGLE, NEW MEXICO**  
*G.O. BACHMAN*, U.S. Dept. of the Interior, Geological Survey
- 3.0170 GEOLOGY OF THE RAPID CITY AREA, SOUTHERN S.D. AND DAKOTA**



- E. DOBROWOLNY, U.S. Dept. of the Interior, Geological Survey
- 3.0174 NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE  
M.F. KANE, U.S. Dept. of the Interior, Geological Survey
- 3.0175 ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA  
R.W. LEMKE, U.S. Dept. of the Interior, Geological Survey
- 3.0176 DENVER METROPOLITAN AREA, COLORADO  
R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey
- 3.0177 V. A. HOSPITAL SITE EVALUATIONS  
T.C. NICHOLS, U.S. Dept. of the Interior, Geological Survey
- 3.0178 SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO  
S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey
- 3.0179 EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO  
S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey
- 3.0180 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH  
P.P. ORKILD, U.S. Dept. of the Interior, Geological Survey
- 3.0181 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO  
D. SCHLEICHER, U.S. Dept. of the Interior, Geological Survey
- 3.0182 SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO  
B. SKIPP, U.S. Dept. of the Interior, Geological Survey
- 3.0184 HAMILTON 2 DEGREE  
J.D. WELLS, U.S. Dept. of the Interior, Geological Survey
- 3.0185 SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO  
P.L. WILLIAMS, U.S. Dept. of the Interior, Geological Survey
- 3.0197 SEISMIC HAZARDS AND LAND-USE PLANNING  
D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey
- 3.0198 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 3.0243 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN  
P.H. JONES, U.S. Dept. of the Interior, Geological Survey

U.S. DEPT. OF INTERIOR - O. WTR. RES. RCH.

U.S. DEPT. OF TRANSPORTATION - F.H.A.

- 3.0010 EARTHQUAKE - INDUCED EMBANKMENT TRESS  
R.A. FORSYTH, State Div. of Highways
- 3.0012 THE SAN FERNANDO EARTHQUAKE AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE  
R.H. PRYOCK, State Materials & Res. Dept.
- 3.0086 INVESTIGATION OF HIGHWAY BRIDGE METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES  
PENZIEN, Univ. of California, School of Engineering
- 3.0152 ELASTOMERIC ENERGY ABSORBER  
E.F. NORDLIN, State Materials & Res. Dept.
- 3.0204 TECHNIQUES FOR RETROFITTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE  
ROBINSON, IIT Research Institute

U.S. DEPT. OF TRANSPORTATION - N.T.S.

- 3.0199 PROTECTION OF TRANSPORTATION TIES AGAINST EARTHQUAKES  
UNKNOWN, U.S. Dept. of Transportation, National Safe. Bd.

U.S. EXECUTIVE OFFICE - O.E.P.

- 3.0022 REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV.)  
J.V. COYNE, Public Administration Service
- 3.0161 A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS  
UNKNOWN, U.S. Dept. of Commerce, Environmental Laboratories

U.S. EXECUTIVE OFFICE - O.S.T.

- 3.0200 REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PRIORITIES  
K.V. STEINBRUGGE, U.S. Exec. Office of the President, Science & Technology

U.S. NATL. AERO. & SPACE ADM.

- 3.0071 EVALUATION OF FEASIBILITY OF SEISMICALLY ACTIVE FAULTS IN ALASKA  
L. GEDNEY, Univ. of Alaska, Geophysical Institute
- 3.0266 SEISMICITY INVESTIGATIONS IN THE MOUNTAINS AND VICINITY, OREGON, 1961 - 30 APRIL, 1970  
H.R. BLANK, Univ. of Oregon, School of Liberal Arts
- 3.0274 THE EFFECT OF YIELD STRENGTH

- BUDGETING FOR EARTHQUAKE HAZARD MITIGATION**  
**J.H. WIGGINS**, John H. Wiggins Company
- 3.0009 BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH**  
**J.H. WIGGINS**, John H. Wiggins Company
- 3.0016 SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW RISE BUILDINGS - COLORADO**  
**R.E. SCHOLL**, John A. Blume & Associates
- 3.0023 RESPONSE OF POWER SYSTEMS TO THE SAN FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971**  
**A.J. SCHIFF**, Purdue University, School of Aeronautics
- 3.0026 DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE**  
**R.V. WHITMAN**, Mass. Inst. of Technology, School of Engineering
- 3.0027 LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES**  
**I. KASIRAJ**, Univ. of New Mexico, Bureau of Engineering Research
- 3.0028 STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES**  
**B.A. BOLT**, Univ. of California, School of Letters
- 3.0032 ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION**  
**R.W. CLOUGH**, Univ. of California, Earthquake Engin. Res. Ctr.
- 3.0037 EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES**  
**K.L. LEE**, Univ. of California, School of Engineering
- 3.0038 IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN**  
**S.F. MASRI**, Univ. of Southern California, School of Engineering
- 3.0040 MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA**  
**H.C. SHIAH**, Stanford University, School of Engineering
- 3.0042 NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING**  
**D.E. HUDSON**, Calif. Inst. of Technology, School of Engineering
- 3.0043 DYNAMICS OF BUILDING - SOIL INTERACTION**  
**P.C. JENNINGS**, Calif. Inst. of Technology, Earthquake Engin. Res. Lab.
- 3.0060 SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS**  
**B.O. HARDIN**, Univ. of Kentucky, School of Engineering
- 3.0061 THE FORMULATION AND EXPERIMENTAL VERIFICATION OF MATHEMATICAL MODELS FOR PREDICTING DYNAMIC RESPONSE OF MULTISTORY BUILDINGS**  
**M.H. ACKROYD**, Mass. Inst. of Technology, School of Engineering
- 3.0063 DAMAGE PROBABILITY MATRIX FOR PROTOTYPE BUILDINGS**  
**R.V. WHITMAN**, Mass. Inst. of Technology, School of Engineering
- 3.0064 SUMMARY OF METHODOLOGY AND APPLICATION**  
**R.V. WHITMAN**, Mass. Inst. of Technology, School of Engineering
- 3.0068 STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS**  
**D.P. BILLINGTON**, Princeton University, School of Engineering
- 3.0075 EARTHQUAKE SAFETY OF SCHOOL BUILDINGS**  
**B. BRESLER**, Univ. of California, School of Engineering
- 3.0078 NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS**  
**H.A. FRANKLIN**, Univ. of California, School of Engineering
- 3.0079 GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF STRUCTURES**  
**A.E. KANAN**, Univ. of California, Earthquake Engin. Ctr.
- 3.0087 THREE DIMENSIONAL STABILITY ANALYSIS AND MODELLING OF STRONG EARTHQUAKE MOTIONS**  
**J. PENZIEN**, Univ. of California, School of Engineering
- 3.0090 OPTIMUM DESIGN OF EARTHQUAKE RESISTANT SHEAR BUILDINGS**  
**D. RAY**, Univ. of California, Earthquake Engin. Res. Ctr.
- 3.0103 SOIL LIQUEFACTION DURING EARTHQUAKES**  
**K.L. LEE**, Univ. of California, School of Engineering
- 3.0136 APPLICATION OF DECISION THEORY TO STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA**  
**J.R. BENJAMIN**, Stanford University, School of Engineering
- 3.0137 APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING**  
**K. HOEGG**, Stanford University, School of Engineering
- 3.0138 STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CALIFORNIA**  
**A. NUR**, Stanford University, School of Earth Sciences
- 3.0139 CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES**  
**C.R. ALLEN**, Calif. Inst. of Technology, Graduate School of Engineering
- 3.0142 EVALUATION OF THE INCREMENTAL RISK DUE TO RESERVOIR FILLING**  
**G.W. HOUSNER**, Calif. Inst. of Technology, School of Engineering
- 3.0143 THREE-YEAR OPERATION OF THE NATIONAL TIES COUNCIL FOR EARTHQUAKE ENGINEERING RESEARCH**  
**W.D. IVAN**, Calif. Inst. of Technology, Graduate School of Engineering

3.0147 A STUDY OF STRONG EARTHQUAKE GROUND  
MOTION USING AN ARRAY OF ACCELEROGRAPHS  
- CALIFORNIA

M.D. TRIFUNAC, Calif. Inst. of Technology, School of En-  
gineering

3.0148 ANALYSIS OF THE EARTHQUAKE RESPONSE  
OF A NINE-STORY STEEL FRAME BUILDING DUR-  
ING THE SAN FERNANDO EARTHQUAKE

J.H. WOOD, Calif. Inst. of Technology, Earthquake Engin.  
Res. Lab.

3.0153 EARTH STRUCTURE AND FAULT TECTONICS  
AS RELATED TO EARTHQUAKE PREDICTION -  
CALIFORNIA

J. BERGER, Univ. of California, Graduate School

3.0192 BUILDING PRACTICES FOR DISASTER MITIGA-  
TION

R.N. WRIGHT, U.S. Dept. of Commerce, Natl. Bureau of  
Standards

3.0202 A STUDY OF MICROEARTHQUAKES IN THE  
SOUTHEASTERN UNITED STATES

L.T. LONG, Georgia Inst. of Technology, School of  
Geosciences

3.0205 STRESS-STRAIN RELATIONSHIPS OF REINFORC-  
ING BARS SUBJECTED TO LARGE STRAIN REVER-  
SALS

A.E. AKTAN, Univ. of Illinois, School of Engineering

3.0206 EFFECTS OF TWO-DIMENSIONAL  
EARTHQUAKE MOTION ON A REINFORCED  
CONCRETE COLUMN

A.E. AKTAN, Univ. of Illinois, School of Engineering

3.0208 PROBABILISTIC METHODS IN CIVIL ENGINEER-  
ING

A.H. ANG, Univ. of Illinois, School of Engineering

3.0210 RESPONSE AND ENERGY-DISSIPATION OF  
REINFORCED CONCRETE FRAMES SUBJECTED TO  
STRONG BASE MOTIONS

P. GULKAN, Univ. of Illinois, School of Engineering

3.0211 EARTHQUAKE EFFECTS ON REINFORCED  
CONCRETE BUILDINGS

M.A. SOZEN, Univ. of Illinois, School of Engineering

3.0212 EVALUATION OF STRUCTURAL DAMAGE  
CAUSED BY EARTHQUAKE TOWARD THE  
DEVELOPMENT OF EARTHQUAKE-RESISTANT  
DESIGN (ABBREV)

M.A. SOZEN, Univ. of Illinois, School of Engineering

3.0214 SHEAR STRENGTH DECAY IN REINFORCED  
CONCRETE COLUMNS SUBJECTED TO LARGE  
DEFLECTION REVERSALS

J.K. WIGHT, Univ. of Illinois, School of Engineering

3.0215 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC  
STRUCTURES

T.L. PAEZ, Purdue University, School of Civil Engin.

3.0216 SHEAR MODULUS AND DAMPING IN SOILS -  
DESIGN EQUATIONS AND CURVES

B.O. HARDIN, Univ. of Kentucky, School of Engineering

3.0226 SEISMIC GROUND EFFECTS IN THE LIGHT OF  
NEW THEORIES OF TECTONICS AND EARTHQUAKE

3.0227 SEISMIC DESIGN OF EARTHQUAKE-RESISTANT  
STRUCTURES

J.E. ISBELL, Mass. Inst. of Technology,  
gineering

3.0228 NONLINEAR AND COUPLED SEIS

J.M. ROESSET, Mass. Inst. of Technology  
gineering

3.0229 SEISMIC DESIGN DECISION A  
EASTERN METROPOLITAN AREAS

R.V. WHITMAN, Mass. Inst. of Technology  
gineering

3.0230 METHODOLOGY AND PILOT APP

R.V. WHITMAN, Mass. Inst. of Technology  
gineering

3.0231 EARTHQUAKE INDUCED TRAC  
PRESSURES IN EARTH DAMS

V.L. STREETER, Univ. of Michigan, School

3.0236 A MICROEARTHQUAKE STUDY O  
MISSISSIPPI VALLEY - ARKANSAS, M  
TENNESSEE

O.W. NUTTLI, St. Louis University, Graduat

3.0240 RESEARCH IN EARTH STRAINS  
MECHANISMS - MISSOURI

W. STAUDER, St. Louis University, School

3.0251 PROBABILITY OF FATIGUE FA  
EARTHQUAKE LOADS

J. TANG, Univ. of New Mexico, Bureau  
Research

3.0252 A STATISTICAL STUDY OF SOME  
CEPTS IN EARTHQUAKE ENGINEERIN

P.H. WIRSCHING, Univ. of New Mexico  
gineering Research

3.0253 ADAPTIVE STRUCTURAL SYSTEM

J.T. YAO, Univ. of New Mexico, Bureau  
Research

3.0255 DYNAMIC BEHAVIOR OF BILL  
TURAL SYSTEMS

H.Y. YEH, Univ. of New Mexico, Bureau  
Research

3.0257 LARGE SCALE INTEGRATION  
PLANNING WITH APPLICATIONS TO  
ING PLANNING IN REGIONS SUBJEC  
RAL HAZARDS

B.G. JONES, Cornell University, School of

3.0260 EXPERIMENTAL AND THEORE  
OF THE DILATANCY-DIFFUSION  
EARTHQUAKE PREDICTION

C.H. SCHOLZ, Columbia University, I  
Geolog. Observ.

3.0261 SEISMOLOGY AND GLOBAL T  
STUDY OF SEISMICITY GAPS AND  
EARTHQUAKES

L.R. SYKES, Columbia University, Lamont  
Observ.

3.0264 AGE, GEOMETRY, AND STRE  
FOUR MAJOR FAULTS OF THE  
TRANSVERSE RANGES BY EVALUAT

**3.0268 SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES**

*B.F. HOWELL*, Penn. State University, School of Earth Sciences

**3.0273 INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE**

*K.H. STOKOE*, Univ. of Texas, Graduate School

**3.0276 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH**

*S.H. WARD*, Univ. of Utah, School of Mines

**3.0277 SEISMICITY STUDIES OF THE CENTRAL APALACHIAN REGION**

*G.A. BOLLINGER*, Virginia Polytechnic Institute, School of Arts

**3.0279 DYNAMIC STABILITY OF EARTH STRUCTURES**

*R.C. BOSTROM*, Univ. of Washington, School of Arts

**3.0280 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK**

*R.S. CROSSON*, Univ. of Washington, School of Arts

**3.0281 BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN**

*B. GONEN*, Univ. of Washington, School of Engineering

**3.0282 SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS**

*N.M. HAWKINS*, Univ. of Washington, School of Engineering

**3.0283 SEISMIC ACTIVITY OF THE CASCADE VOLCANOES**

*S.W. SMITH*, Univ. of Washington, School of Arts

**U.S. VETERANS ADMINISTRATION**

**3.0189 STRENGTH OF EXISTING MASONRY WALLS**

*S.G. FATTAL*, U.S. Dept. of Commerce, Natl. Bureau of Standards

**3.0201 EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES**

*UNKNOWN*, U.S. Veterans Administration, Hospitals Clinics & Reg. Off.

**UNIVERSITY OF CALIFORNIA**

**3.0003 LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES**

*T. IWASAKI*, Univ. of California, Earthquake Engin. Res. Ctr.

**3.0029 EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION**

*P. CHAKRABARTI*, Univ. of California, Earthquake Engin. Res. Ctr.

**3.0033 STOCHASTIC INELASTIC RESPONSE OFFSHORE TOWERS TO STRONG EARTHQUAKES**

*M.K. KAUL*, Univ. of California, Earthquake Ctr.

**3.0035 SHAKE - A COMPUTER PROGRAM FOR EARTHQUAKE RESPONSE ANALYSIS OF TALLY LAYERED SITES**

*P.B. SCHNABEL*, Univ. of California, Earthquake Res. Ctr.

**3.0073 STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO FLEXURAL MOMENTS**

*V.V. BERTERO*, Univ. of California, Earthquake Ctr.

**3.0076 EXPERIMENTAL INVESTIGATION OF THE SEISMIC BEHAVIOR OF CRITICAL REINFORCED CONCRETE COMPONENTS INFLUENCED BY MOMENT AND SHEAR**

*M. CELEBI*, Univ. of California, Earthquake Ctr.

**3.0077 ADAP - A COMPUTER PROGRAM FOR THE ANALYSIS OF ARCH DAMS**

*R.W. CLOUGH*, Univ. of California, Earthquake Ctr.

**3.0081 CONSTITUTIVE MODELS FOR CYCLIC DEFORMATION OF ENGINEERING MATERIALS**

*J.M. KELLY*, Univ. of California, Earthquake Ctr.

**3.0082 INELASTIC BEHAVIOR OF STEEL COLUMN SUBASSEMBLAGES**

*H. KRAVINKLER*, Univ. of California, Earthquake Res. Ctr.

**3.0083 INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE**

*J. LYSMER*, Univ. of California, Earthquake Ctr.

**3.0084 RATE OF LOADING EFFECTS ON UNREINFORCED AND REPAIRED REINFORCED CONCRETE MEMBERS**

*S.A. MAHIN*, Univ. of California, Earthquake Ctr.

**3.0085 ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS**

*T. MINAMI*, Univ. of California, Earthquake Ctr.

**3.0088 CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS UNDER HIGH SHEAR**

*E.P. POPOV*, Univ. of California, Earthquake Ctr.

**3.0089 CYCLIC LOADING OF FULL-SCALE REINFORCED CONCRETE WALLS**

*E.P. POPOV*, Univ. of California, Earthquake Ctr.

**3.0091 DYNAMIC BEHAVIOR OF A**

## EARTHQUAKES

*P.B. SCHNABEL*, Univ. of California, Earthquake Engin. Res. Ctr.

### 3.0093 MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS

*P.B. SCHNABEL*, Univ. of California, Earthquake Engin. Res. Ctr.

### 3.0095 ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971

*H.B. SEED*, Univ. of California, Earthquake Engin. Res. Ctr.

### 3.0096 SOIL MODULI AND DAMPING FACTORS FOR DYNAMIC RESPONSE ANALYSES

*H.B. SEED*, Univ. of California, Earthquake Engin. Res. Ctr.

### 3.0097 A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL

*H.B. SEED*, Univ. of California, Earthquake Engin. Res. Ctr.

### 3.0098 ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES

*W. TSENG*, Univ. of California, Earthquake Engin. Res. Ctr.

### 3.0099 STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS

*E.L. WILSON*, Univ. of California, Earthquake Engin. Res. Ctr.

## UNIVERSITY OF ILLINOIS

### 3.0059 SEISMIC DESIGN OF LOW-RISE BUILDINGS

*W.J. HALL*, Univ. of Illinois, School of Engineering

### 3.0207 SEISMIC BEHAVIOR OF FRAMED TUBES

*J.C. ANDERSON*, Univ. of Illinois, Graduate School

### 3.0209 ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES

*J. GHABOUSSI*, Univ. of Illinois, School of Engineering

### 3.0213 PROBABILISTIC MODELING OF EXTREME LOADS

*Y.K. WEN*, Univ. of Illinois, School of Engineering

## EXPANSIVE SOILS

## U.S. DEPT. OF DEFENSE - ARMY

### 4.0002 INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV)

*L.D. JOHNSON*, U.S. Army, Waterways Experiment Station

### 4.0003 REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS

*L.D. JOHNSON*, U.S. Army, Waterways Experiment Station

## SUPPORTING ORG

*J.T. ALFORE*, State Div. of Mines & Geology

## U.S. DEPT. OF INTERIOR - BU. RECLAM

### 4.0007 STABILIZATION OF EXPANSIVE CLAY SHALES

*R.D. RICHMOND*, U.S. Dept. of the Interior, Reclamation

## U.S. DEPT. OF INTERIOR - GEOLOGICAL

### 4.0004 GEOLOGY OF THE RAPID CITY AREA, S. DAKOTA

*J.M. CATTERMOLLE*, U.S. Dept. of the Interior, Survey

### 4.0005 DENVER URBAN CORRIDOR STUDY, COLORADO

*W.R. HANSEN*, U.S. Dept. of the Interior, Geology

### 4.0006 SURFICIAL GEOLOGY OF JUNEAU AREA, ALASKA

*R.D. MILLER*, U.S. Dept. of the Interior, Geological Survey

## U.S. NATL. SCIENCE FOUNDATION

### 4.0008 UNIVERSITY-INDUSTRY WORKSHEP ON HAZARDS AND DAMAGE RELATED TO EARTH MATERIALS

*D. RICHARD*, Univ. of Denver, Graduate School

## UNIVERSITY OF SOUTHERN MISS. - HATTIESBURG

### 4.0009 MAPPING OF SURFACE MATERIALS AND PREDICTING FOUNDATION CHARACTERISTICS FOR FUTURE DEVELOPMENT OF HATTIESBURG

*B.W. BROWN*, Univ. of Southern Mississippi, School of Science

## FOREST & GRASS FIRES

## ALABAMA STATE GOVERNMENT - MONTGOMERY

### 5.0001 PROFILING THE FOREST INCENDIARY: ANALYSIS OF DOCUMENTED CASE HISTORIES

*J.E. DUNKELBERGER*, Auburn University, Agricultural Experiment Sta.

## NATL. ACADEMY OF SCIENCES - WASHINGTON

### 5.0009 EMPLOYMENT OF AIR OPERATIONS IN FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM HELD AT ARGONNE NATIONAL LAB. (ABBREV)

*UNKNOWN*, Natl. Acad. of Sciences

## U.S. DEPT. OF AGRICULTURE

- C.M. COUNTRYMAN*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0005 GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA MIXED-CONIFER TYPE  
*L.R. GREEN*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0010 A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I - SUMMARY - MAIN STUDY RECOMMENDATIONS AND FINDINGS  
*UNKNOWN*, U.S. Dept. of Agriculture, Div. of Administrative Mgmt.
- 5.0015 FOREST FIRES IN MISSOURI  
*D.A. HAINES*, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta.
- 5.0016 FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA  
*R.W. SANDO*, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta.
- 5.0028 AIRBORNE INFRARED FOREST FIRE DETECTION SYSTEM  
*R.A. WILSON*, U.S. Dept. of Agriculture, Northern Forest Fire Lab.
- 5.0033 FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT  
*C.J. AUVIL*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0034 FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971  
*G.C. BERNARDI*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0035 ALLOCATION MODEL FOR FIREFIGHTING RESOURCES  
*F.W. BRATTEN*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0036 CHARACTERISTICS OF PEOPLE WHO START FIRES ...SOME PRELIMINARY FINDINGS - CALIFORNIA  
*J.R. CHRISTIANSEN*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0037 REDUCING FIRE HAZARD IN PONDEROSA PINE THINNING SLASH BY MECHANICAL CRUSHING - OREGON  
*J.D. DELL*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0038 FOREST FIRE HISTORY - A COMPUTER METHOD OF DATA ANALYSIS  
*R.M. MEES*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0039 PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL  
*P.G. SCOWCROFT*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0045 FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN  
*D.A. HAINES*, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta.

## U.S. DEPT. OF AGRICULTURE - F.S.

- 5.0002 PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST  
*A.W. LINDENMUTH*, Northern Ariz. University, U.S.D.A. Rky. Mtn. Forest Sta.
- 5.0006 FOREST FIRE BEHAVIOR - CALIFORNIA  
*C.M. COUNTRYMAN*, U.S. Dept. of Agriculture, Pac. SW For. & Rg. Exp. Sta.
- 5.0007 FIRE MANAGEMENT SYSTEMS  
*J.B. DAVIS*, U.S. Dept. of Agriculture, Pac. SW For. & Rg. Exp. Sta.
- 5.0011 DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS  
*R.W. JOHANSEN*, U.S. Dept. of Agriculture, S.E. Forest Experiment Station
- 5.0014 FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES  
*V.J. JOHNSON*, Michigan State University, U.S.D.A. N. Cen. For. Ex. Sta.
- 5.0017 RESEARCH AND DEVELOPMENT OF FIRE PREVENTION TECHNOLOGY (FIRE PREVENTION)  
*M.L. DOOLITTLE*, Mississippi St. University, U.S.D.A. S. Forest Expt. Sta.
- 5.0018 PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO FIRE PHENOMENA  
*H.E. ANDERSON*, U.S. Dept. of Agriculture, Intermtn. For. & Rg. Exp. Sta.
- 5.0019 METHODS FOR THE PREVENTION AND CONTROL OF LIGHTNING FIRES  
*R.G. BAUGHMAN*, U.S. Dept. of Agriculture, Intermtn. For. & Rg. Exp. Sta.
- 5.0020 CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS  
*C.E. HARDY*, U.S. Dept. of Agriculture, Intermtn. For. & Rg. Exp. Sta.
- 5.0025 FIRE PREVENTION - CALIFORNIA  
*W.S. FOLKMAN*, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.
- 5.0027 NATIONAL FIRE DANGER RATING  
*J.W. LANCASTER*, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta.
- 5.0040 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION  
*M.J. SCHROEDER*, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Exp. Sta.
- 5.0042 DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS  
*R.W. COOPER*, U.S. Dept. of Agriculture, S.E. Forest Experiment Station
- 5.0043 THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH

S.N. HIRSCH, U.S. Dept. of Agriculture, Intermt. For. & Rg. Exp. Sta.

U.S. DEPT. OF COMMERCE - NOAA

5.0029 RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION  
D.W. KRUEGER, U.S. Dept. of Commerce, Natl. Weather Service

5.0031 OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA  
J.D. KANUPP, U.S. Dept. of Commerce, Natl. Weather Service

U.S. DEPT. OF DEFENSE - AIR FORCE

5.0030 THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY  
V.I. BINENKO, U.S. Air Force, Foreign Technology Division

U.S. DEPT. OF DEFENSE - ARMY

5.0023 NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME 1  
A. SACHS, Inst. For Defense Analysis

U.S. DEPT. OF DEFENSE - NAVY

5.0012 THE GREAT OAKLAND, LOS ANGELES, AND SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970  
R.S. ALGER, U.S. Navy, Ordnance Laboratory

U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT

5.0026 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)  
J.T. ALFORE, State Div. of Mines & Geology

U.S. DEPT. OF INTERIOR - O.W.R.T.

5.0022 EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS  
H.A. WRIGHT, Texas Technological University, School of Agriculture  
5.0044 DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS  
G. YAMATE, IIT Research Institute

U.S. NATL. AERO. & SPACE ADM.

5.0013 STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING ERTS DATA - ALASKA  
W.A. DEUTSCHMAN, Smithsonian Institution

U.S. NATL. SCIENCE FOUNDATION

5.0008 CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH  
N.T. GRISAMORE, Natl. Acad. of Sciences  
5.0021 A MODEL OF THE FORESTS OF GLACIER NATIONAL PARK, MONTANA  
R.H. WHITTAKER, Cornell University, School of Biological Sciences  
5.0024 MECHANISMS OF WILDLAND FIRE SUPPRESSION  
R.C. CORLETT, Univ. of Washington, School of Engineering  
5.0041 FOREST FIRE STATISTICAL PROBLEMS  
F.N. DAVID, Univ. of California, School of Agriculture

FLOODS

ALABAMA STATE GOVERNMENT - MONTGOMERY

6.0214 FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA  
C.O. MING, U.S. Dept. of the Interior, Geological Survey

AUBURN UNIVERSITY

6.0157 STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA  
S.P. SNOY, Auburn University, Center For Urban & Reg. Plan.

CALIFORNIA STATE GOVERNMENT - SACRAMENTO

6.0044 SOUTH COASTAL BASIN PRECIPITATION FREQUENCY - A REGIONAL ANALYSIS OF DEPLETION FREQUENCY OF SHORT-DURATION PRECIPITATION IN CALIFORNIA  
J.D. GOODRIDGE, State Dept. of Water Resources

CHICAGO CITY GOVERNMENT - ILLINOIS

6.0083 DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA - COMPUTER SIMULATION PROGRAMS  
D.H. CHURCHILL, Illinois Inst. For Envir. Qlty

COLORADO STATE UNIVERSITY - FORT COLLINS

6.0190 HYDROLOGY OF SMALL WATERSHEDS  
V. YEVJEVICH, Colorado State University, School of Engineering

FLORIDA STATE GOVERNMENT - TALLAHASSEE

ILLINOIS STATE GOVERNMENT - SPRINGFIELD

- 6.0084 BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS  
*UNKNOWN*, Southwestern Ill. Plan. Comm.
- 6.0263 STREAMFLOW VARIABILITY - ILLINOIS  
*K.P. SINGH*, State Water Survey

IOWA STATE GOVERNMENT - DES MOINES

- 6.0064 COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

MISSISSIPPI RES. & DEV. CENTER - JACKSON

- 6.0309 ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI  
*P.J. BARLOW*, State Comm. & Area Dev. Div.

MONTANA STATE UNIVERSITY - BOZEMAN

- 6.0125 APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I - REPORT  
*E.R. DODGE*, Montana State University, School of Engineering

NEW JERSEY STATE GOVERNMENT - TRENTON

- 6.0323 HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY  
*K. NATHAN*, Rutgers the State University, Agricultural Experiment Sta.

NEW YORK STATE GOVERNMENT - ALBANY

- 6.0130 REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK  
*J.A. FINCK*, State Dept. of Env. Conserv.
- 6.0337 APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN  
*J.W. KELLEY*, State University of New York, Agricultural Experiment Sta.

NO FORMAL SUPPORT REPORTED

- 6.0016 A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES  
*F.F. CHANG*, Fed. City College, Graduate School
- 6.0035 ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA  
*D.B. KNOWLES*, State Geol. Survey
- 6.0052 REGULATION OF GREAT LAKES WATER

6.0170 GLENDORA, CALIFORNIA, GENERAL 1990

*UNKNOWN*, Glendora City Government

- 6.0177 PROCEDURES FOR ESTIMATING FLOOD FROM SMALL RURAL WATERSHEDS  
*R.K. LINSLEY*, Hydrocomp International

- 6.0229 FLOOD HAZARD EVALUATION GUIDE FOR FEDERAL EXECUTIVE AGENCIES  
*UNKNOWN*, U.S. Water Resources Council

- 6.0299 PREDICTION OF THE MAGNITUDE AND FREQUENCIES OF FLOODS IN MICHIGAN  
*E.F. BRATER*, Univ. of Michigan, School of Engineering

OHIO STATE GOVERNMENT - COLUMBUS

- 6.0347 DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE FLOOD PLAIN MANAGEMENT PROGRAM  
*G.M. CLARK*, Ohio State University, School of Engineering
- 6.0348 STREAMFLOW SIMULATION AND PROFILE DETERMINATION IN OHIO - STUDY  
*V.T. RICCA*, Ohio State University, School of Engineering

OHIO STATE UNIVERSITY

- 6.0346 APPLICATION OF COST-EFFECTIVE TECHNIQUES TO THE DESIGN OF A FLOOD PLAIN  
*G.M. CLARK*, Ohio State University, School of Engineering

PALM BEACH COUNTY GOVERNMENT - FORT PALM

- 6.0235 FLOOD PLAIN STUDY AND MODELING OF FLOOD PLAIN ORDINANCE  
*UNKNOWN*, Palm Beach Co. Area Plan. Bd.

RIVERSIDE COUNTY GOVT. - CALIFORNIA

- 6.0042 SAN GORGONIO PASS, CALIFORNIA FLOOD PLAIN TECHNICAL REPORT  
*UNKNOWN*, Council on Intergov. Relations

SALT LAKE COUNTY GOVERNMENT - UTAH

- 6.0031 STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY  
*J.P. RILEY*, Utah State University, Utah Ctr. for Water Resour.

TEXAS STATE GOVERNMENT - AUSTIN

- 6.0388 RELATION OF CLIMATIC AND WATER RESOURCES CHARACTERISTICS TO STORM RUNOFF IN THE GUADALUPE PLATEAU - TEXAS  
*W.G. KNISEL*, U.S. Dept. of Agriculture, Blackland Prairie Watershed

U.S. DEPT. OF AGRICULTURE



- UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0195 KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0196 UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0197 HOLLOW CREEK WATERSHED PROJECT, SOUTH CAROLINA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0198 KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0199 NUTWOOD WATERSHED, ILLINOIS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0200 HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0201 CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0202 BIG CREEK WATERSHED, KANSAS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0203 MACADOO ROAD-FILL DAM, KANSAS  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0204 STARKWEATHER WATERSHED, NORTH DAKOTA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0205 VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service
- 6.0206 WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA  
UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service

## U.S. DEPT. OF AGRICULTURE - C.S.R.S.

- 6.0085 LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES  
B.A. JONES, Univ. of Illinois, Agricultural Experiment Sta.
- 6.0265 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS

D.J. ALLEE, State University of New York, Agricultural Experiment Sta.

## U.S. DEPT. OF AGRICULTURE - E.R.

- 6.0194 ANALYSIS OF LAND USE CONTROL  
W.D. ANDERSON, U.S. Dept. of Agriculture, Resource Econ. Div

## U.S. DEPT. OF AGRICULTURE - F.S.

- 6.0041 FLOOD AND SEDIMENT REDUCTION UNSTABLE BRUSHLANDS OF THE SOUTH  
R.M. RICE, U.S. Dept. of Agriculture, Pacific Reg. Exp. Sta.

## U.S. DEPT. OF COMMERCE - E.S.S.

- 6.0057 ESSA AND OPERATION FORESIGHT  
UNKNOWN, U.S. Dept. of Commerce, National Atmos. Admin.

## U.S. DEPT. OF COMMERCE - N.B.S.

- 6.0001 DISASTER INVESTIGATIONS  
C.G. CULVER, U.S. Dept. of Commerce, National Standards

## U.S. DEPT. OF COMMERCE - N.O.A.

- 6.0006 FLOOD INSURANCE STUDY  
D. FEIT, U.S. Dept. of Commerce, Technical Lab.
- 6.0021 METEOROLOGICAL AND HYDROLOGIC ANALYSIS OF THE AUGUST 27-28, 1971 SEY FLOOD  
H.S. GROPER, U.S. Dept. of Commerce, Weather Service
- 6.0022 THE METEOROLOGICAL AND HYDROLOGIC ASPECTS OF THE MAY 1968 NEW JERSEY FLOOD  
A.S. KACHIC, U.S. Dept. of Commerce, Weather Service
- 6.0036 WORTH OF HYDROLOGIC DATA FOR SHORT TERM FORECASTS OF FLOODS  
M. SNIEDOVICH, Univ. of Arizona, Graduate School
- 6.0056 BLACK HILLS FLOOD OF JUNE 9, 1936  
UNKNOWN, U.S. Dept. of Commerce, National Atmos. Admin.

- 6.0070 STUDIES OF THE RED ALGAE IN BAY  
A. THORHAUG, Univ. of Miami, School of Marine Biology

- 6.0081 WATER WARNINGS AND SHORT TERM FORECASTS  
UNKNOWN, U.S. Air Force, Air Weather Service

- 6.0103 HYDROLOGIC DATA COLLECTION USING STATIONARY SATELLITE  
A.F. FLANDERS, U.S. Dept. of Commerce, Weather Service

- 6.0104 HYDROLOGIC EQUIPMENT - FLOOD WARNING SYSTEM

*C. HETRICK*, Univ. of California, School of Letters

**6.0207 LAKE HYDROLOGY**

*L. BAJORUNAS*, U.S. Dept. of Commerce, Limnology Division

**6.0289 CLIMATES OF THE STATES - CLIMATE OF NEW YORK**

*A.B. PACK*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

**6.0290 PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA**

*J.T. RIEDEL*, U.S. Dept. of Commerce, National Weather Service

**6.0341 EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST**

*R.L. INGRAM*, Univ. of North Carolina, School of Arts

**6.0359 ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS**

*D.G. AREY*, Univ. of Pittsburgh, Graduate School

**6.0391 FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION**

*P. WILLIAMS*, U.S. Dept. of Commerce, Natl. Weather Service

**U.S. DEPT. OF DEFENSE - ARMY**

**6.0017 UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL**

*UNKNOWN*, Upper Miss. Riv. Comp. Comm.

**6.0032 NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I**

*A. SACHS*, Inst. For Defense Analysis

**6.0033 SPEWRELI BLUFF LAKE, FLINT RIVER, GEORGIA**

*UNKNOWN*, U.S. Army, Engineer District

**6.0037 HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES**

*L.R. BEARD*, U.S. Army, Hydrologic Engineering Center

**6.0038 RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL**

*B.S. EICHERT*, U.S. Army, Hydrologic Engineering Center

**6.0053 CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION**

*C.P. LINDNER*, U.S. Army, Corps of Engineers

**6.0054 JACKSON HOLE FLOOD CONTROL PROJECT**

*UNKNOWN*, U.S. Army, Corps of Engineers

**6.0086 OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS**

*H.M. KARARA*, Univ. of Illinois, School of Engineering

**6.0095 HYDROLOGIC STUDIES (STORM STUDIES)**

*B.L. GARRETT*, U.S. Army, Engineering Division

*UNKNOWN*, U.S. Army, Engineer District

**6.0097 NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION**

*UNKNOWN*, U.S. Army, Engineer District

**6.0098 LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT**

*UNKNOWN*, U.S. Army, Engineer District

**6.0099 MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA)**

*UNKNOWN*, U.S. Army, Engineer District

**6.0100 RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS**

*UNKNOWN*, U.S. Army, Engineer District

**6.0101 THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS**

*R.W. RAUFSE*, Mathematica Incorporated

**6.0108 HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT**

*UNKNOWN*, U.S. Army, New England Division

**6.0109 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS**

*UNKNOWN*, U.S. Army, New England Division

**6.0110 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS**

*UNKNOWN*, U.S. Army, New England Division

**6.0111 NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT**

*UNKNOWN*, U.S. Army, New England Division

**6.0116 DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION**

*C.E. CHATHAM*, U.S. Army, Waterways Experiment Station

**6.0117 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION**

*G.A. PICKERING*, U.S. Army, Waterways Experiment Station

**6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION**

*G.A. PICKERING*, U.S. Army, Waterways Experiment Station

**6.0119 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES**

*H.B. SIMMONS*, U.S. Army, Waterways Experiment Station

**6.0120 FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS**

*UNKNOWN*, U.S. Army, Waterways Experiment Station

**6.0121 FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER VALLEY**

*UNKNOWN*, U.S. Army, Lower Miss. Valley Div.

- 6.0172 SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT  
UNKNOWN, U.S. Army, Engineer District
- 6.0173 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS  
N.V. ARVANITIDIS, I N T A S A Incorporated
- 6.0174 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION  
N.V. ARVANITIDIS, I N T A S A Incorporated
- 6.0247 HYDROLOGIC RELATIONS IN HAWAII  
D. JAY, U.S. Army, Pacific Ocean Division
- 6.0257 COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT  
J.R. SHEAFFER, Univ. of Chicago, Center For Urban Studies
- 6.0312 MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY  
J.J. FRANCO, U.S. Army, Waterways Experiment Station
- 6.0313 MISSISSIPPI BASIN MODEL  
UNKNOWN, U.S. Army, Waterways Experiment Station
- 6.0314 DEMONSTRATION OF THE ELECTRIC ANALOG MODEL OF THE KANSAS RIVER AT THE UNIVERSITY OF CALIFORNIA IN BERKELEY  
UNKNOWN, U.S. Army, Waterways Experiment Station
- 6.0315 FORT SCOTT LAKE, MARMATON RIVER, KANSAS  
UNKNOWN, U.S. Army, Engineer District
- 6.0320 MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI  
UNKNOWN, U.S. Army, Engineer District
- 6.0358 FLOOD-PROOFING REGULATIONS  
UNKNOWN, U.S. Army, Engineer District
- 6.0405 FLOOD HAZARD INFORMATION - BUFFALO CREEK, LOGAN COUNTY, WEST VIRGINIA POST-DISASTER CONDITIONS  
UNKNOWN, U.S. Army, Corps of Engineers

U.S. DEPT. OF HLTH. ED. & WEL.

- 6.0014 DELIVERING VOCATIONAL REHABILITATION SERVICES IN A DISASTER AREA  
W.R. PHELPS, State Div. of Voc. Rehab.
- 6.0398 FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT  
W.R. WALKER, Virginia Polytechnic Institute, Water Resources Research Ctr.

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- 6.0003 SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS

FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA  
UNKNOWN, State Dept. of Pub. Welfare

- 6.0009 MENTAL HEALTH SERVICES TO FLOOD DISASTER AREAS IN LUZERN COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA  
UNKNOWN, Hazleton Nanticoke M.H. C.
- 6.0010 TRAINING AND EVALUATION OF HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA  
UNKNOWN, Eastern Penn. Psych. Instit.
- 6.0011 MENTAL HEALTH SERVICES TO FLOOD DISASTER AREAS IN LUZERN COUNTIES, COMMONWEALTH OF PENNSYLVANIA  
UNKNOWN, Luzerne Wyoming Co. M.H. C.
- U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT
- 6.0002 THE FEDERAL RESPONSE TO THE STORM AGNES: A REPORT TO THE COMMISSION ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF  
UNKNOWN, U.S. Exec. Office of the President, Agency Preparedness
- 6.0005 FLOOD INSURANCE STUDY  
C. BARRIENTOS, U.S. Dept. of Commerce, Weather Service
- 6.0024 LOCK HAVEN URBAN RECOVERY PROJECT, LOCK HAVEN, PENNSYLVANIA  
UNKNOWN, U.S. Dept. of Hou. & Urb. Disaster Rec. Off.
- 6.0025 MODEL CITIES ONE - URBAN RECOVERY PROJECT, READING, PENNSYLVANIA  
UNKNOWN, U.S. Dept. of Hou. & Urb. Disaster Rec. Off.
- 6.0026 PENN-SUSQUEHANNA URBAN RECOVERY PROJECT, HARRISBURG, PENNSYLVANIA  
UNKNOWN, U.S. Dept. of Hou. & Urb. Disaster Rec. Off.
- 6.0027 MILTON SOUTH, MILTON NORTH TOWNSHIP DISASTER, URBAN RECOVERY PROJECT, PENNSYLVANIA  
UNKNOWN, U.S. Dept. of Hou. & Urb. Disaster Recovery Office
- 6.0028 DOWNTOWN URBAN RECOVERY PROJECT, WILKES-BARRE, PENNSYLVANIA  
UNKNOWN, U.S. Dept. of Hou. & Urb. Disaster Recovery Office
- 6.0029 KINGSTON DISASTER URBAN RECOVERY PROJECT, BOROUGH OF KINGSTON, LEHIGH COUNTY, PENNSYLVANIA, HUD PROJECT  
UNKNOWN, U.S. Dept. of Hou. & Urb. Disaster Rec. Off.

J.T. ALFORE, State Div. of Mines &amp; Geology

H.W. LEE, State Planning &amp; Com. Aff. Agcy

6.0046 DRAINAGE AND FLOOD CONTROL  
BACKGROUND AND POLICY STUDY - SAN DIEGO  
G.S. NOLTE, San Diego Co. Comp. Plan. Org.

6.0258 NATURAL CAPABILITIES - THE  
CREEK SERIES, MACON COUNTY, ILLINOIS  
UNKNOWN, Macon Co. Regional Plan Comm.

6.0047 INITIAL WATER, SEWERAGE AND FLOOD  
UNKNOWN, San Diego Co. Comp. Plan. Org.

6.0260 A COMPREHENSIVE PLAN FOR STE  
COUNTY, ILLINOIS  
UNKNOWN, Stephenson Co. Planning Comm.

6.0072 ORANGE, SEMINOLE, OSCEOLA COUNTIES -  
WATER MANAGEMENT  
UNKNOWN, East Cent. Florida Reg. Coun.

6.0262 PRIORITY AND PLANNING ELEME  
DEVELOPING ILLINOIS WATER RESOURCE  
UNKNOWN, State Dept. of Bus. & Dev.

6.0087 DRAINAGE AND FLOOD CONTROL PLAN -  
MARION COUNTY, INDIANA SEPTEMBER 1970  
UNKNOWN, Marion Co. Metrop. Dev. Dept.

6.0268 ZONING ORDINANCE - KNOX COUN  
ANA  
UNKNOWN, Clyde E. Williams & Assoc. Inc.

6.0127 PRELIMINARY STORM DRAINAGE AND FLOOD  
CONTROL PLAN - UNION COUNTY, N.J.  
E.T. KILLAM, Union County Planning Board

6.0283 ZONING ORDINANCE AND ORDER, PI  
TY, ELKHORN CITY, KENTUCKY  
UNKNOWN, State Program Dev. Office

6.0128 FACTORS PERTINENT TO WATER QUALITY IN  
THE ALBUQUERQUE METROPOLITAN AREA  
UNKNOWN, Albuquerque Urban Observatory

6.0284 ZONING ORDINANCE - PAINTSVIL  
TUCKY  
UNKNOWN, State Program Dev. Office

6.0133 WATER RELATED ENVIRONMENTAL SERVICES  
UNKNOWN, Central New York Reg. Pln. Bd.

6.0286 FLOOD PLAN FOR BULLITT COUN  
TUCKY  
A. WAHBY, Bullitt Co. Planning Comm.

6.0148 COMPREHENSIVE PLAN, CITY OF HAMILTON,  
TEXAS  
UNKNOWN, State Div. of Comp. Planning

6.0295 RE-DRAFT OF SEEKONK ZONING BY  
NOVEMBER 1969  
J. BLACKWELL, State Dept. of Community Affs

6.0158 A GUIDE FOR REDUCING FLOOD DAMAGE IN  
THE SOUTH ALABAMA REGION  
UNKNOWN, South Alabama Reg. Plan. Comm.

6.0307 URBAN SYSTEMS - STORM DRAI  
FLOOD PLAIN MANAGEMENT, S  
SEWERAGE, SOLID WASTE MANAGEM  
BREV)

6.0159 FLOOD MANAGEMENT STUDY  
UNKNOWN, Tuscaloosa Area Coun. of Gov.

J.A. ELLIOTT, Diversified Consultants Inc.

6.0160 FLOOD MANAGEMENT STUDY - TUSCALOOSA,  
PICKENS COUNTY AND MOUNDSVILLE, ALABAMA,  
MAY 1971  
UNKNOWN, Tuscaloosa Area Coun. of Gov.

6.0308 URBAN SYSTEMS - WATERWORKS, S  
SEWERAGE, SOLID WASTE MANAGEM  
DRAINAGE & FLOOD PLAIN MANAGEM  
BREV)

6.0178 NORTH RICHMOND - SAN PABLO BAY AREA  
STUDY - CALIFORNIA  
J.P. KENNY, Council on Intergov. Relations

J.A. ELLIOTT, Diversified Consultants Inc.

6.0179 GENERAL PLAN REPORT, LAKE RED BLUFF  
AREA, CALIFORNIA, 1971  
UNKNOWN, Council on Intergov. Relations

6.0329 STREAMS AND DRAINAGE BASINS -  
COUNTY, NEW YORK  
UNKNOWN, State Off. of Plan. Services

6.0181 DRAINAGE AND FLOOD CONTROL  
BACKGROUND AND POLICY STUDY - SUMMARY  
REPORT  
UNKNOWN, San Diego Reg. Comp. Pl. Org.

6.0330 PUTNAM COUNTY OFFICIAL  
PROPOSALS FOR REVISION AND EXPANSI  
UNKNOWN, State Off. of Plan. Services

6.0192 RECOMMENDED REGIONAL PLAN FOR  
SEWERAGE, WATER SUPPLY AND STORM  
DRAINAGE - CONNECTICUT  
UNKNOWN, Valley Regional Planning Agcy.

6.0332 COMPREHENSIVE PLAN - REPORT C  
MENTATION - VILLAGE OF EAST AUR  
TOWN OF AURORA, N.Y.  
UNKNOWN, Aurora Planning Board

6.0231 SARASOTA - ZONING AND SUBDIVISION CON  
TROLS - REVIEW, ANALYSIS, AND RECOMMENDA  
TIONS CONCERNING CURRENT REGULATIONS  
E.R. BARTLEY, Tampa Bay Regional Plan. Coun.

H.H. LADAGE, Columbia Co. Planning Dept.

6.0236 FLOOD PLAIN STUDY AND MODEL FLOOD  
PLAIN ORDINANCE, MARCH, 1972  
UNKNOWN, Palm Beach Co. Area Plan. Bd.

6.0340 DRAINAGE STUDY - INVENTORY AND  
SIS  
UNKNOWN, Genesee Finger Lake Reg. Board

6.0245 WATER RESOURCES OF MIDDLE GEORGIA

6.0352 FLOOD PLAIN ANALYSIS AND DISAS  
DY, CLATSOP AND TILLAMOOK C  
OREGON - 1972-1973  
UNKNOWN, Clatsop Tillamook Intergov.

# FLOODS

- 6.0354 DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973  
UNKNOWN, Lincoln Co. Planning Dept.
- 6.0362 FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO  
UNKNOWN, State Planning Board
- 6.0363 MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN  
UNKNOWN, State Planning & Grants Div.
- 6.0369 ZONING ORDINANCE, HUNTINGDON, TENNESSEE  
UNKNOWN, State Planning Commission
- 6.0380 OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY  
UNKNOWN, U.S. Coastal Bend Reg. Comm.
- 6.0381 SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS  
UNKNOWN, Texoma Regional Planning Comm.
- 6.0385 PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT  
G.L. WILLIAMS, Lockwood Andrews & Newman Inc.

## U.S. DEPT. OF INTERIOR - BU. RECLAMATION

- 6.0171 CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS  
R.D. ELLIOTT, North Amer. Weather Consult
- 6.0183 FLOOD HYDROLOGY INVESTIGATIONS  
F.A. BERTLE, U.S. Dept. of the Interior, Bureau of Reclamation

## U.S. DEPT. OF INTERIOR - BUREAU OF MINES

- 6.0015 ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME I  
UNKNOWN, W.A. Wahler & Associates
- 6.0040 ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME II, APPENDICES  
UNKNOWN, W.A. Wahler & Associates

## U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY

- 6.0020 FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO  
L.A. WAITE, U.S. Dept. of the Interior, Geological Survey
- 6.0023 FLOOD FREQUENCY AND HIGH-FLOW STUDIES  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0034 FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA  
C.O. MING, U.S. Dept. of the Interior, Geological Survey

# FLOOD FREQUENCY IN URBAN AREAS - COLORADO

G.L. DUCRET, U.S. Dept. of the Interior, Geological Survey

- 6.0049 PEAK DISCHARGE AND FREQUENCY OF SMALL WATERSHEDS IN COLORADO  
G.L. DUCRET, U.S. Dept. of the Interior, Geological Survey

# FLOOD FLOWS FROM SMALL DRAINAGE AREAS

J.D. CAMP, U.S. Dept. of the Interior, Geological Survey

- 6.0062 FLOW REGULATION EFFECTS OF BURLINGTON RESERVOIR FROM DOWNSTREAM TO WESTHOPE, NORTH CAROLINA  
J.O. SHEARMAN, U.S. Dept. of the Interior, Geological Survey

# FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO

C.A. THOMAS, U.S. Dept. of the Interior, Geological Survey

- 6.0067 HYDROLOGIC AND BIOLOGIC STUDY OF SOUTHWEST FLORIDA (BIG CYPRESS) WATERSHED  
H. KLEIN, U.S. Dept. of the Interior, Geological Survey

# RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHWEST FLORIDA

W.A. PITT, U.S. Dept. of the Interior, Geological Survey

- 6.0069 HYDROLOGIC BASE FOR WATER RESOURCES MANAGEMENT, DADE COUNTY, FLORIDA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

# ESTUARINE HYDROLOGY OF TAMPA BAY, FLORIDA

C.R. GOODWIN, U.S. Dept. of the Interior, Geological Survey

# FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA

H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey

# FLOOD INVESTIGATIONS FOR SMALL DRAINAGE AREAS IN IDAHO

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

# FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS

G.W. CURTIS, U.S. Dept. of the Interior, Geological Survey

# STREAMFLOW CHARACTERISTICS, KANSAS

R. HEDMAN, U.S. Dept. of the Interior, Geological Survey

# FLOOD INVESTIGATIONS - HIGHWAY 101 - KANSAS

H.R. HEJL, U.S. Dept. of the Interior, Geological Survey

# FLOOD-FREQUENCY STUDY - KENTUCKY

C.H. HANNUM, U.S. Dept. of the Interior, Geological Survey

# FLOOD FREQUENCY OF SMALL DRAINAGE AREAS IN LOUISIANA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

# FLOODS FROM SMALL DRAINAGE AREAS IN MONTANA

# SUPPORTING ORGANIZATION

- C.G. JOHNSON, U.S. Dept. of the Interior, Geological Survey
- 6.0114 BRIDGE SITE INVESTIGATIONS  
C.H. TATE, U.S. Dept. of the Interior, Geological Survey
- 6.0115 SPECIAL FLOOD REPORTS - MISSISSIPPI  
C.H. TATE, U.S. Dept. of the Interior, Geological Survey
- 6.0129 INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO  
A.G. SCOTT, U.S. Dept. of the Interior, Geological Survey
- 6.0134 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA  
A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey
- 6.0135 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA  
A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey
- 6.0136 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA  
A.L. PUTNAM, U.S. Dept. of the Interior, Geological Survey
- 6.0138 MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA  
O.A. CROSBY, U.S. Dept. of the Interior, Geological Survey
- 6.0139 STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA  
V.B. SAUER, U.S. Dept. of the Interior, Geological Survey
- 6.0140 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0143 TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0147 FLOOD INVESTIGATIONS - TENNESSEE  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0149 HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0156 RUNOFF SIMULATION  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0161 FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA  
A.L. KNIGHT, U.S. Dept. of the Interior, Geological Survey
- 6.0164 APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES  
M.L. BROWN, U.S. Dept. of the Interior, Geological Survey
- 6.0165 DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0168 PERRIS VALLEY URBAN HYDROLOGY STUDY  
J.A. SINGER, U.S. Dept. of the Interior, Geological Survey
- 6.0176 FLOODS FROM SMALL DRAINAGE CALIFORNIA  
A.O. WAANANEN, U.S. Dept. of the Interior, Geological Survey
- 6.0180 FLOOD-FREQUENCY RELATIONSHIPS IN SMALL DRAINAGE AREAS - VIRGINIA  
E.M. MILLER, U.S. Dept. of the Interior, Geological Survey
- 6.0184 DENVER METROPOLITAN AREA, COLORADO  
R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey
- 6.0185 MOUNTAIN SOILS, FRONT RANGE CORRIDOR  
K.L. PIERCE, U.S. Dept. of the Interior, Geological Survey
- 6.0186 PEAK DISCHARGE AND FREQUENCY OF SMALL WATERSHEDS IN COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0187 FLOOD FREQUENCY IN URBAN COLORADO  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0188 HAMILTON 2 DEGREE  
J.D. WELLS, U.S. Dept. of the Interior, Geological Survey
- 6.0193 SMALL STREAM FLOOD CHARACTERISTICS  
M.D. THOMAS, U.S. Dept. of the Interior, Geological Survey
- 6.0210 PEAK FLOW FROM SMALL DRAINAGE AREAS IN CONNECTICUT  
J. HORTON, U.S. Dept. of the Interior, Geological Survey
- 6.0211 HYDROLOGY OF OUTSTANDING FLOODS  
E.J. KENNEDY, U.S. Dept. of the Interior, Geological Survey
- 6.0215 FLOOD-FREQUENCY AND BASIN PAI RELATIONSHIPS IN SMALL DRAINAGE AREAS  
H.C. RIGGS, U.S. Dept. of the Interior, Geological Survey
- 6.0218 IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0220 DEVELOPMENT OF HYDROLOGIC DATA COLLECTION WORKS IN URBAN AREAS  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0221 PROGRAM DESIGN-1971 - SAN FRANCISCO REGION ENVIRONMENT AND RE PLANNING STUDY  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey
- 6.0230 GEOHYDROLOGIC CONDITIONS AND POTENTIALS IN THE SINK AREAS OF WESTERN SEMINOLE COUNTY, FLORIDA  
W. ANDERSON, U.S. Dept. of the Interior, Geological Survey
- 6.0233 MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE AREAS IN FLORIDA  
W.C. BRIDGES, U.S. Dept. of the Interior, Geological Survey

6.0244 ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA  
H.G. GOLDEN, U.S. Dept. of the Interior, Geological Survey

6.0248 FLOOD INUNDATION STUDY - WISCONSIN  
R.S. GRANT, U.S. Dept. of the Interior, Geological Survey

6.0249 SPECIAL FLOOD DATA COLLECTION, HAWAII  
R. LEE, U.S. Dept. of the Interior, Geological Survey

6.0250 FLOOD PLAIN MAPPING IN HAWAII  
R.H. NAKAHARA, U.S. Dept. of the Interior, Geological Survey

6.0251 SPECIAL FLOOD-DATA COLLECTION - HAWAII  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

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O.G. LARA, U.S. Dept. of the Interior, Geological Survey

6.0275 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey

6.0276 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA  
O.G. LARA, U.S. Dept. of the Interior, Geological Survey

6.0277 FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA  
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H.H. SCHWOB, U.S. Dept. of the Interior, Geological Survey

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C.O. GEIGER, U.S. Dept. of the Interior, Geological Survey

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RICHARDS, U.S. Dept. of the Interior, Geological Survey

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B.E. WASSON, U.S. Dept. of the Interior, Geological Survey

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K.V. WILSON, U.S. Dept. of the Interior, Geological Survey

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D.W. SPENCER, U.S. Dept. of the Interior, Geological Survey

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6.0325 FLOOD PLAIN AND PEAK FLOWS IN NEW JERSEY  
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W.H. EDDINS, U.S. Dept. of the Interior, Geological Survey

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UNKNOWN, U.S. Dept. of the Interior, Geological Survey
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J.W. BOARD, U.S. Dept. of the Interior, Geological Survey
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J.D. BOHN, U.S. Dept. of the Interior, Geological Survey
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UNKNOWN, U.S. Dept. of the Interior, Geological Survey
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G.R. DEMPSTER, U.S. Dept. of the Interior, Geological Survey
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B.C. MASSEY, U.S. Dept. of the Interior, Geological Survey
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S.L. JOHNSON, U.S. Dept. of the Interior, Geological Survey
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UNKNOWN, U.S. Dept. of the Interior, Geological Survey
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UNKNOWN, U.S. Dept. of the Interior, Geological Survey
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P.L. SOULE, U.S. Dept. of the Interior, Geological Survey
- 6.0401 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA  
F.P. KAPINOS, U.S. Dept. of the Interior, Geological Survey
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J.E. CUMMANS, U.S. Dept. of the Interior, Geological Survey
- 6.0404 FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON  
J.E. CUMMANS, U.S. Dept. of the Interior, Geological Survey
- 6.0407 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II)  
D.C. CONGER, U.S. Dept. of the Interior, Geological Survey
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P.A. KAMMERER, U.S. Dept. of the Interior, Geological Survey
- 6.0409 FLOOD INUNDATION STUDY, WISCONSIN  
J.O. SHERMAN, U.S. Dept. of the Interior, Geological Survey
- 6.0414 FLOOD INVESTIGATIONS IN WYOMING  
H.W. LOWHAM, U.S. Dept. of the Interior, Geological Survey
- 6.0415 STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING  
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W.R. WALKER, Virginia Polytechnic Institute, Graduate School
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J.R. BARNARD, Univ. of Iowa, School of Liberal Arts
- 6.0073 CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE III  
L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center



## FLOODS

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K. UNHANAND, Utah State University, Utah Ctr. For Wtr. Resour. Res.
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LIJSEN, I N T A S A Incorporated
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L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center
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D.D. MEREDITH, Univ. of Illinois, School of Engineering
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E.R. KAYNOR, Univ. of Massachusetts, School of Management
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S.M. LEADLEY, Penn. State University, Inst. Res. Land & Wtr. Resour.
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J.J. PEEBLES, Univ. of Idaho, Water Resources Research Inst.
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T.P. CHANG, Purdue University, Water Resources Research Ctr.
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L.D. JAMES, Univ. of Kentucky, Water Resources Institute
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W.M. GRAYMAN, Mass. Inst. of Technology, School of Engineering
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T.E. HARBAUGH, Univ. of Missouri, Water Resources Research Ctr.
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A.T. HJELMFELT, Univ. of Missouri, School of Engineering
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T.E. HARBAUGH, Univ. of Missouri, Water Resources Research Ctr.
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T.T. WILLIAMS, Montana State University, Water Resources Research Ctr.
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C.S. LIU, State Dept. of Env. Conserv.
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J.E. GODDARD, Amer. Soc. of Civil Engrs.
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B.M. REICH, Penn. State University, Inst. Res. Land & Wtr. Resour.
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D.R. BASCO, Texas A & M University System, School of Engineering
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C.F. FLOYD, Univ. of Georgia, School of Business Admin.
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L.D. JAMES, Georgia Inst. of Technology, Environmental Resources Center
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G.E. WILLEKE, Georgia Inst. of Technology, Environmental Resources Center
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E. KEENE, North Kennebec Reg. Pln. Comm.

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REDUCTION ALTERNATIVES IN THE MINNESOTA  
RIVER BASIN  
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ANALYSIS  
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Lab.
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STRUCTURE OF THE LOWER MINNESOTA RIVER  
WATERSHED DISTRICT  
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THE 50 AND 100 YEAR INTERVAL FLOOD ZONES  
OF THE BITTERROOT VALLEY, MONTANA  
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ANALYSIS  
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DEVELOPMENT OF WATER RESOURCES MANAGE-  
MENT PLANS FOR NEW YORK STATE - VOLUME I  
*A.C. TEDROW*, State Div. of Water Resources
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METROPOLITAN WATER RESOURCE SYSTEMS -  
VOLUME IV - MODELS FOR MANAGING  
METROPOLITAN SURFACE WATER SYSTEMS  
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LAND RESOURCES OF OKLAHOMA  
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JECTS IN OREGON  
*R.E. EMMER*, Oregon State University, Water Resources  
Research Inst.
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FLOODS IN COMPARISON TO BRIDGE DESIGN IN-  
FORMATION AVAILABLE FOR PENNSYLVANIA  
CONTEMPORANEOUSLY  
*B.M. REICH*, Unknown Inst. or Individ. Grant
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Wtr. Resour.
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RESOURCES PLANNING AND MANAGEMENT - THE  
PROCEEDINGS OF THE ANNUAL CONFERENCE  
HELD AT SAN ANTONIO (ABBREV)  
*UNKNOWN*, Texas A & M University System, Water  
Resources Institute

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IAL SYSTEM RELATED TO DRAINAGE PR  
OF URBAN AREAS  
*W.H. ANDREWS*, Utah State University, Inst. F  
Science Res.
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THE JAMES RIVER - VIRGINIA  
*D.N. CONTRACTOR*, Virginia Polytechnic Institut  
of Engineering
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BENEFITS AND COSTS OF FLOOD PLAIN  
TION - VIRGINIA  
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VIRGINIA  
*W.R. WALKER*, Virginia Polytechnic Institute  
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FLOOD PLAIN HAZARD ZONES - SOIL SURV  
*G.B. LEE*, Univ. of Wisconsin, Water Resources C
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MENT AND FLOOD PLAIN DELINEATION  
*C.J. MILFRED*, Univ. of Wisconsin, School of Agr
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FOR DELINEATING AND REGULATING  
PLAINS - LEGAL AND ADMINISTRATIV  
SIDERATIONS  
*D.A. YANGGEN*, Univ. of Wisconsin, Water I  
Center
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CALIFORNIA  
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*D.B. SIMONS*, Colorado State University, School  
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FROM SMALL DRAINAGE AREAS IN OHIO  
*W.P. CROSS*, U.S. Dept. of the Interior, Geological
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*R. CUSHMAN*, U.S. Dept. of the Interior, Geologic
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AREAS - MISSISSIPPI  
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*L.S. LEVEEN*, U.S. Dept. of the Interior, Geological Survey

- 6.0213** FLOOD FREQUENCY OF ALABAMA STREAMS - ALABAMA

*J.F. MCCAIN*, U.S. Dept. of the Interior, Geological Survey

- 6.0216** WATER RESOURCES INVESTIGATIONS

*V.B. SAUER*, U.S. Dept. of the Interior, Geological Survey

- 6.0217** INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA

*W. THOMAS*, U.S. Dept. of the Interior, Geological Survey

- 6.0219** INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA

*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

- 6.0222** INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA

*B.H. WHETSTONE*, U.S. Dept. of the Interior, Geological Survey

- 6.0327** FLOOD FREQUENCY STUDY IN NEW MEXICO

*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

- 6.0356** COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA

*B.M. REICH*, Unknown Inst. or Indiv. Grant

#### U.S. ENVIRON. PROTECT. AGENCY - O.R.M.

- 6.0112** RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS

*E.F. BRATER*, Univ. of Michigan, School of Engineering

#### U.S. NATL. AERO. & SPACE ADM

- 6.0030** MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY

*L.A. BENSON*, South Dakota State University, Remote Sensing Institute

- 6.0209** INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION TO THEMATIC MAPPING, MISSISSIPPI RIVER

*D.T. EDSON*, U.S. Dept. of the Interior, Geological Survey

- 6.0298** USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS

*F.J. THOMSON*, Environmental Res. Inst. Mich.

- 6.0393** SURVEY OF LAKE FLOODING FROM ERTS-1 - LAKE CHAMPLAIN

*A.O. LIND*, Univ. of Vermont, School of Arts

*D.C. COX*, Univ. of Hawaii, School of Arts

- 6.0259** RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION

*R.B. COROTIS*, Northwestern University, School of Technology

#### U.S. TENNESSEE VALLEY AUTH.

- 6.0367** DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE

*E.H. LESENE*, U.S. Tennessee Valley Auth., Div. of Water Cont. Plan.

- 6.0368** BEECH RIVER WATERSHED PROJECT - TENNESSEE

*C.H. SMITH*, U.S. Tennessee Valley Auth.

#### U.S. WATER RESOURCES COUNCIL - WASH., D.C.

- 6.0223** STANDARDS FOR PLANNING WATER AND LAND RESOURCES

*UNKNOWN*, U.S. Water Resources Council

- 6.0224** A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES

*UNKNOWN*, U.S. Water Resources Council

- 6.0225** FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES

*UNKNOWN*, U.S. Water Resources Council

- 6.0226** REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV

*UNKNOWN*, U.S. Water Resources Council

- 6.0227** NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL REPORT, FISCAL YEAR 1971

*UNKNOWN*, U.S. Water Resources Council

- 6.0228** OHIO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U. S. WATER RESOURCES COUNCIL (ABBREV)

*UNKNOWN*, U.S. Water Resources Council

- 6.0350** APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971

*UNKNOWN*, State Water Resour. Board

#### UNIVERSITY OF ALABAMA

- 6.0162** LAND-USE REGULATIONS IN FLOOD-PRONE AREAS - A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW

*H. COHEN*, Univ. of Alabama, Natural Resources Center

#### UNIVERSITY OF HAWAII

- 6.0077** FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII

*Y.S. FOK*, Univ. of Hawaii, Water Resources Research Ctr.

# VIRGINIA POLYTECHNIC INST. - BLACKSBURG

- 6.0012 PROCEEDINGS - COMMUNITY WORKSHOP ON FLOOD INSURANCE  
*J.E. HACKETT*, Virginia Polytechnic Institute, Water Resources Research Ctr.

# WASHINGTON STATE GOVERNMENT - OLYMPIA

- 6.0402 PILOT STUDY OF FLOOD PLAIN MANAGEMENT - WASHINGTON  
*J.F. ORSBORN*, Washington State University, School of Engineering

# WYOMING STATE GOVERNMENT - CHEYENNE

- 6.0189 INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES  
*D. SIMONS*, Colorado State University, School of Engineering

# HAIL

## U.S. ATOMIC ENERGY COMMISSION

- 7.0017 TRACER STUDIES IN THE NATIONAL HAIL RESEARCH EXPERIMENT (NHRE)  
*J.A. YOUNG*, Battelle Memorial Institute

## U.S. DEPT. OF AGRICULTURE - C.S.R.S.

- 7.0004 SOYBEAN PHYSIOLOGY AND MANAGEMENT  
*J.J. FORST*, Purdue University, Agricultural Experiment Sta.  
 7.0006 WEATHER MODIFICATION IN NORTH DAKOTA  
*W.J. PROMERSBERGER*, North Dakota State University, Agricultural Experiment Sta.

## U.S. DEPT. OF AGRICULTURE - E.R.S.

- 7.0001 ESTIMATING CROP LOSSES DUE TO HAIL. STATISTICAL SUPPLEMENT TO AGRICULTURAL ECONOMIC REPORT NO. 267  
*L.M. BOONE*, U.S. Dept. of Agriculture, Economic & Stat. Analysis Div.  
 7.0002 MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE  
*L.A. JONES*, U.S. Dept. of Agriculture, Farm Production Economics Div.  
 7.0005 ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL.  
*L. BOONE*, Univ. of Nebraska, U.S.D.A. Nat. Resour. Ec. Div.

## U.S. DEPT. OF COMMERCE - N.O.A.A.

- 7.0012 HAIL AND LIGHTNING - COLORADO  
*H. WEICKMANN*, U.S. Dept. of Commerce, Environ. Research Laboratories  
 7.0016 THUNDERSTORMS AND HAIL - RAINFALL PRO-

# U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT

- 7.0009 URBAN GEOLOGY PLAN FOR CALIFORNIA. THE NATURE, MAGNITUDE, & COSTS OF SEISMIC HAZARDS & RECOMMENDATIONS FOR MITIGATION (ABBREV)  
*J.T. ALFORE*, State Div. of Mines & Geology

## U.S. NATL. SCIENCE FOUNDATION

- 7.0003 A STUDY OF CROP-HAIL INSURANCE FOR NORTHEASTERN COLORADO WITH REFERENCE TO THE DESIGN OF THE NATIONAL HAIL RESEARCH EXPERIMENT  
*P.T. SCHICKEDANZ*, State Water Survey  
 7.0007 ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL.  
*L.M. BOONE*, U.S. Dept. of Agriculture, Research Service  
 7.0008 STUDIES OF HAIL DATA IN 1970-72 - COLORADO  
*S.A. CHANGNON*, State Water Survey  
 7.0010 NATIONAL HAIL RESEARCH EXPERIMENT REPORT FOR 1973 - COLORADO  
*J.W. FIROR*, Natl. Center For Atmosph. Res.  
 7.0011 THE NATIONAL HAIL RESEARCH EXPERIMENT. SUMMER 1973 SUMMARY REPORT  
*UNKNOWN*, Natl. Center For Atmosph. Res.  
 7.0013 EXTENDED AREA EFFECTS FROM WEATHER MODIFICATION  
*L.O. GRANT*, Colorado State University, School of Engineering  
 7.0014 NATIONAL HAIL RESEARCH EXPERIMENT. COLORADO, NEBRASKA, WYOMING  
*UNKNOWN*, U.S. Natl. Science Foundation  
 7.0015 DESIGN OF HAIL SUPPRESSION EXPERIMENT IN ILLINOIS  
*G.M. MORGAN*, Univ. of Illinois, School of Lib. Studies  
 7.0018 STUDY OF THE FEATURES AND BUDGETS OF NORTHEASTERN COLORADO STORMS - ALSO, WISCONSIN  
*C.E. ANDERSON*, Univ. of Wisconsin, School of Sciences

# HURRICANES

## NO FORMAL SUPPORT REPORTED

- 8.0026 EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DUNEDIN COUNTY, FLORIDA  
*UNKNOWN*, Miami Federal Executive Board

## U.S. DEPT. OF COMMERCE - ECON. DEV. ADMIN.

- 8.0011 GRANT TO DESIGN A REBUILDING PROGRAM FOR

- 8.0012 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE. VOLUMES IV & V (ABBREV)  
UNKNOWN, State Res. & Dev. Center

U.S. DEPT. OF COMMERCE - MARITIME ADMIN.

- 8.0076 HURRICANE EFFECTS ON PORT FACILITIES  
R.D. MARSHALL, U.S. Dept. of Commerce, Natl. Bureau of Standards

U.S. DEPT. OF COMMERCE - N.B.S.

- 8.0074 HURRICANE CAMILLE - AUGUST 1969  
R.D. DIKKERS, U.S. Dept. of Commerce, Building Research Div.

- 8.0077 DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS  
W.F. REPS, U.S. Dept. of Commerce, Center For Building Technology

- 8.0078 WIND AND SURGE DAMAGE DUE TO HURRICANE CAMILLE  
H.C. THOM, U.S. Dept. of Commerce, Natl. Bureau of Standards

U.S. DEPT. OF COMMERCE - N.O.A.A.

- 8.0002 COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA  
F.J. SWAYE, Univ. of Delaware, School of Arts

- 8.0004 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1974  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0005 ATLANTIC HURRICANE SEASON OF 1972  
R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service

- 8.0007 THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE  
H.S. SAFFIR, Unknown Inst. or Indiv. Grant

- 8.0016 MEMORABLE HURRICANES OF THE UNITED STATES SINCE 1973  
A.L. SUGG, U.S. Dept. of Commerce, Natl. Weather Service

- 8.0020 NATIONAL HURRICANE OPERATION PLAN  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0021 NATIONAL HURRICANE OPERATIONS PLAN 1974  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0023 THE HOMEPORT STORY - AN IMAGINARY CITY GETS READY FOR A HURRICANE  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0029 WATER WARNINGS AND SPECIALIZED FORECASTS  
UNKNOWN, U.S. Air Force, Air Weather Service

- 8.0057 HURRICANE MODIFICATION  
R.C. GENTRY, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0058 TROPICAL METEOROLOGIC PROBLEMS  
R.C. GENTRY, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0059 A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS  
C.P. JELESNIANSKI, U.S. Dept. of Commerce, Weather Modification Prg. Off.

- 8.0060 STORM SURGE RESEARCH  
F. OSTAPOFF, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0061 HURRICANE RESEARCH MODELING  
S.L. ROSENTHAL, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0062 HURRICANE MODELING  
S.L. ROSENTHAL, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0063 HURRICANE-TYPHOON DYNAMICS  
M. SCHERER, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0064 HURRICANE-OCEAN INTERACTION  
M. SCHERER, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0065 SEA-AIR INTERACTION LABORATORY OPERATIONS  
H.B. STEWART, U.S. Dept. of Commerce, Environ. Research Laboratories

- 8.0066 INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES  
W.M. GRAY, Colorado State University, School of Engineering

- 8.0068 HURRICANE SPAWNED TORNADOES  
D.J. NOVLAN, Colorado State University, School of Engineering

- 8.0069 THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION  
D.J. SHEA, Colorado State University, School of Engineering

- 8.0075 A TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES  
V.F. DVORAK, U.S. Dept. of Commerce, Natl. Environ. Satellite Serv.

- 8.0086 COMPUTER METHODS APPLIED TO ATLANTIC AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY  
*J.R. HOPE*, U.S. Dept. of Commerce, Natl. Weather Service
- 8.0087 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST)  
*B.R. JARVINEN*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0088 CIRCULATION FEATURES OF TROPICAL CYCLONES  
*B.R. JARVINEN*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0089 PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL  
*B.I. MILLER*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0090 GRAPHICAL DISPLAY OF HURRICANE FORECASTS  
*C.J. NAUMANN*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0091 STATISTICAL-DYNAMICAL PREDICTION OF HURRICANE TRACKS  
*C.J. NEUMANN*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0092 ERROR ANALYSIS OF HURRICANE FORECASTS  
*J.M. PELISSIER*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0093 BAROTROPIC PREDICTION OF HURRICANE TRACKS  
*A.C. PIKE*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0094 LANDFALL ERRORS IN HURRICANE FORECASTS  
*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0096 HURRICANE MODIFICATION BY CLOUD SEEDING  
*M.A. ESTOQUE*, Univ. of Miami, School of Marine Science
- 8.0097 GIANT WAVES HIT HAWAII  
*J. BOTTOMS*, U.S. Dept. of Commerce, Natl. Weather Service
- 8.0098 USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES  
*T. MURAKAMI*, Univ. of Hawaii, School of Arts
- 8.0100 PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY  
*T.T. FUJITA*, Univ. of Chicago, School of Physical Sciences
- 8.0105 EXTENDING THE COMPUTERIZED TYPHOON/TROPICAL STORM PREDICTION PROGRAM (TYPHOON 72) TOWARD SEVEN DAYS  
*UNKNOWN*, Ocean Data Systems Inc.
- 8.0106 BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO  
*M.G. JOHNSON*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 8.0108 VISUAL, IR, AND DATA COLLECTION ABILITIES OF THE GOES SATELLITE  
*A.F. FLANDERS*, U.S. Dept. of Commerce, Natl. Hydrology
- 8.0109 TROPICAL STORM SURGE FORECASTS  
*C.P. JELESNIANSKI*, U.S. Dept. of Commerce, Development Lab.
- 8.0110 SPECIAL PROGRAM TO LIST AMPHITROPE SURGES FROM HURRICANES - PART I  
*C.P. JELESNIANSKI*, U.S. Dept. of Commerce, Development Lab.
- 8.0111 SPECIAL PROGRAM TO LIST AMPHITROPE SURGES FROM HURRICANES - PART II  
*C.P. JELESNIANSKI*, U.S. Dept. of Commerce, Development Lab.
- 8.0112 JOINT PROBABILITY METHOD OF FREQUENCY ANALYSIS APPLIED TO CITY AND LONG BEACH ISLAND, NEW YORK  
*V.A. MYERS*, U.S. Dept. of Commerce, Natl. Weather Service
- 8.0113 MARINE ENVIRONMENTAL PREDICTION  
*N.A. PORE*, U.S. Dept. of Commerce, Technical Lab.
- 8.0114 SUMMARY OF SELECTED MATERIAL ON THE OCEANIC PHENOMENA OF TIDES, STORM SURGES AND BREAKERS  
*N.A. PORE*, U.S. Dept. of Commerce, Technical Lab.
- 8.0115 MARINE CONDITIONS AND FORECASTS FOR THE ATLANTIC COAST OF FEBRUARY 18-20, 1972  
*N.A. PORE*, U.S. Dept. of Commerce, Technical Lab.
- 8.0116 FORECASTING EXTRATROPICAL SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES  
*N.A. PORE*, U.S. Dept. of Commerce, Technical Lab.
- 8.0123 PRELIMINARY CLIMATIC DATA FOR HURRICANE AGNES JUNE 14-23, 1972  
*R.M. DEANGELIS*, U.S. Dept. of Commerce, Natl. Hurricane Center
- 8.0124 ALTERNATIVE ADJUSTMENTS TO HAZARDS  
*D.G. AREY*, Univ. of Pittsburgh, Graduate School
- 8.0126 ANALYTICAL PHYSICAL MODEL  
*F.M. WHITE*, Univ. of Rhode Island, School of Oceanography
- 8.0127 SOUTH CAROLINA HURRICANE DESCRIPTIVE LISTING OF TROPICAL STORMS THAT HAVE AFFECTED SOUTH CAROLINA  
*J.C. PURVIS*, U.S. Dept. of Commerce, Natl. Weather Service
- 8.0128 INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS

*W.N. SEELIG*, Texas A & M University System, Graduate School

**8.0129 OBJECTIVE ANALYSIS OF THE SEA SURFACE TEMPERATURE**

*B.R. JARVINEN*, U.S. Dept. of Commerce, Natl. Weather Service

**8.0130 A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES**

*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service

**8.0131 THE DECISION PROCESS IN HURRICANE FORECASTING**

*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service

**8.0132 ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE**

*R.H. SIMPSON*, U.S. Dept. of Commerce, Natl. Weather Service

**U.S. DEPT. OF DEFENSE - AIR FORCE**

**8.0071 A SURVEY OF AVAILABILITY OF HURRICANE/TYPHOON PACKAGES AND ASSOCIATED DATA**

*A.R. MEALS*, U.S. Air Force, Environ. Tech. Appl. Center

**U.S. DEPT. OF DEFENSE - ARMY**

**8.0003 EFFECTS OF TROPICAL STORM AGNES ON THE CHESAPEAKE BAY**

*D. CORRELL*, Smithsonian Institution

**8.0013 TEXAS COAST HURRICANE SURGE MODEL STUDIES**

*N.J. BROGDON*, U.S. Army, Estuaries Division

**8.0014 SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969**

*M.E. CRISWELL*, U.S. Army, Waterways Experiment Station

**8.0017 NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I**

*A. SACHS*, Inst. For Defense Analysis

**8.0019 CONCRETE BLOCK REVETMENT NEAR BENEDICT, MARYLAND**

*J.V. HALL*, U.S. Army, Coastal Engin. Res. Center

**8.0025 BAL. HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA**

*UNKNOWN*, U.S. Army, Engineer District

**8.0028 JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION**

*UNKNOWN*, U.S. Army, Engineer District

**8.0030 GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV)**

**8.0032 LAKE PONCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT**  
*UNKNOWN*, U.S. Army, Engineer District

**8.0033 MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA)**

*UNKNOWN*, U.S. Army, Engineer District

**8.0034 HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT**

*UNKNOWN*, U.S. Army, New England Division

**8.0035 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS**

*UNKNOWN*, U.S. Army, New England Division

**8.0036 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS**

*UNKNOWN*, U.S. Army, New England Division

**8.0037 NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT**

*UNKNOWN*, U.S. Army, New England Division

**8.0038 GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)**

*W.H. BOBB*, U.S. Army, Waterways Experiment Station

**8.0039 GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV)**

*W.H. BOBB*, U.S. Army, Waterways Experiment Station

**8.0040 GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION**

*N.J. BROGDON*, U.S. Army, Waterways Experiment Station

**8.0041 WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION**

*C.E. CHATHAM*, U.S. Army, Waterways Experiment Station

**8.0042 WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION**

*E.P. FORTSON*, U.S. Army, Waterways Experiment Station

**8.0043 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION**

*E.C. MCNAIR*, U.S. Army, Waterways Experiment Station

**8.0044 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION**

*G.A. PICKERING*, U.S. Army, Waterways Experiment Station

**8.0045 GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV)**

*R.A. SAGER*, U.S. Army, Waterways Experiment Station

**8.0046 GALVESTON BAY HURRICANE SURGE - REPORT 2 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV)**



**8.0047 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES**

*H.B. SIMMONS*, U.S. Army, Waterways Experiment Station

**8.0048 EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL**

*L.C. TALLANT*, U.S. Army, Waterways Experiment Station

**8.0049 THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST**

*T.W. BILHORN*, Gulf Univ. Res. Consortium

**8.0050 VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION**

*UNKNOWN*, U.S. Army, Engineer District

**8.0051 PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO**

*F.M. ABDELAAL*, Univ. of California, School of Engineering

**8.0055 TROPICAL CYCLONES**

*F.E. FENDELL*, T R W Incorporated

**8.0056 THE EFFECTS OF HURRICANE CAMILLE ON INDUSTRY, PUBLIC UTILITIES, AND PUBLIC WORKS OPERATIONS**

*R.H. BLACK*, U R S Systems Corporation

**8.0072 STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION**

*B.R. BODINE*, U.S. Army, Coastal Engin. Res. Center

**8.0073 LONG-PERIOD WAVES AND SURGES**

*UNKNOWN*, U.S. Army, Coastal Engin. Res. Center

**8.0119 JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK**

*T.C. HILL*, U.S. Army, Waterways Experiment Station

**8.0134 FORECASTING STORM-INDUCED BEACH CHANGES ALONG VIRGINIA'S OCEAN COAST**

*W. HARRISON*, Virginia Inst. of Marine Sci.

**U.S. DEPT. OF DEFENSE - D.A.R.P.A.**

**8.0054 TROPICAL CYCLONE ENERGY TRANSFER**

*P. DERGARABEDIAN*, T R W Incorporated

**U.S. DEPT. OF DEFENSE - NAVY**

**8.0008 EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELEUR ISLAND CHAIN AND THE EASTERN PORTION OF THE LOWER MISSISSIPPI DELTA**

*L.D. WRIGHT*, Louisiana State Univ. Systems, Coastal Studies Institute

**8.0052 FURTHER VERIFICATIONS OF AND EXPERIMENTS TO IMPROVE THE MODIFIED HATRACK SCHEME FOR FORECASTING THE MOTION OF TROPICAL CYCLONES**

*S.G. COLGAN*, U.S. Navy, Postgraduate School

**8.0053 TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM PARADISE**

**CEPTS RELATED TO STOCHASTIC ANALYSIS (ABBREV)**

*C.Y. YANG*, Univ. of Delaware, School of Engineering

**8.0080 ATLANTIC TROPICAL CYCLONE PROBABILITIES - VOLUME I - 24 HOURS**

*H.L. CRUTCHER*, U.S. Navy, Weather Service

**8.0081 ATLANTIC TROPICAL CYCLONE PROBABILITIES - VOLUME II - 48 HOURS**

*H.L. CRUTCHER*, U.S. Navy, Weather Service

**8.0082 ATLANTIC TROPICAL CYCLONE PROBABILITIES - VOLUME III - 72 HOURS**

*H.L. CRUTCHER*, U.S. Navy, Weather Service

**8.0103 BEACH CHANGES BY WAVES CAUSED BY HURRICANE**

*C.J. SONU*, Louisiana State Univ. System, Geology Institute

**8.0117 NAVY ENVIRONMENT - FLORIDA RESEARCH**

*G.F. CARRIER*, Harvard University, School of Engineering

**8.0118 PROFILE OF A STORM - WINDS AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN**

*W.T. FOX*, Williams College, Graduate School

**8.0121 CASE STUDIES OF COASTAL EROSION BY STORMS AS OBSERVED BY DOPPLER RADAR**

*C.C. EASTERBROOK*, Calspan Corporation

**8.0136 STORM-SURGE FORECASTING**

*J.W. NICKERSON*, U.S. Navy, Weather Service

**U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT**

**8.0001 THE FEDERAL RESPONSE TO STORM AGNES; A REPORT TO THE JOINT COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF**

*UNKNOWN*, U.S. Exec. Office of the President, Emergency Preparedness

**8.0010 REGIONAL CODE ENFORCEMENT IN HARRISON AND JACKSON COUNTIES**

*P. MONTJOY*, Coast Code Administration

**8.0015 HURRICANE CELIA REDEVELOPMENT STUDY**

*UNKNOWN*, U.S. Coastal Bend Reg. Comm.

**8.0018 URBAN GEOLOGY PLAN FOR THE NATURE, MAGNITUDE, & COSEQUENCES OF SEISMIC HAZARDS & RECOMMENDATIONS FOR MITIGATION (ABBREV)**

*J.T. ALFORE*, State Div. of Mines & Geology

**8.0079 REPORT ON EARTHQUAKE DAMAGE TO THE CONGRESS OF UNITED STATES BUILDING, SECTION FIVE OF SOUTHEASTERN DISTRICT, DISASTER RELIEF ACT 1965**

*UNKNOWN*, U.S. Dept. of Hou. & Urban Affairs, Insurance Administration

**U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY**

- 8.0133 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA  
UNKNOWN, U.S. Dept. of the Interior, Geological Survey

#### U.S. DEPT. OF TRANSPORTATION - COAST GUARD

- 8.0006 APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION  
L.G. ANDERSON, Univ. of Miami, School of Marine Science

#### U.S. NATL. AERO. & SPACE ADM.

- 8.0024 KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA  
A.J. MEHTA, Univ. of Florida, School of Engineering
- 8.0083 HURRICANE PREPAREDNESS AND CONTROL PLAN  
UNKNOWN, U.S. Natl. Aero. & Space Adm., John F. Kennedy Space Center
- 8.0104 MICROWAVE METEOROLOGY  
J.L. KING, U.S. Natl. Aero. & Space Adm., Goddard Space Flight Center
- 8.0122 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER)  
H.L. CRUTCHER, U.S. Dept. of Commerce, Natl. Climatic Center

#### U.S. NATL. SCIENCE FOUNDATION

- 8.0009 ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES  
J.R. SCHUBEL, Johns Hopkins University, Graduate School
- 8.0067 STUDIES OF CUMULUS HEATING AND THE CISK MECHANISM  
W.M. GRAY, Colorado State University, School of Engineering
- 8.0095 PROJECT STORMFURY ANNUAL REPORT 1971  
UNKNOWN, U.S. Dept. of Commerce, Natl. Hurricane Res. Lab.
- 8.0099 THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES  
T. MURAKAMI, Univ. of Hawaii, School of Arts
- 8.0102 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES  
T.L. PAEZ, Purdue University, School of Civil Engin.
- 8.0120 MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS  
Y. KURIHARA, Princeton University, Graduate School
- 8.0125 NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES

- 8.0137 ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS OF EXTRATROPICAL CYCLONES  
D.R. JOHNSON, Univ. of Wisconsin, Graduate School
- 8.0138 NUMERICAL STUDIES IN THE CIRCULATION AND STORM SURGES IN LAKE ONTARIO  
D.B. RAO, Univ. of Wisconsin, School of Letters

#### UNIVERSITY OF ILLINOIS

- 8.0101 PROBABILISTIC MODELING OF LOADS  
Y.K. WEN, Univ. of Illinois, School of Engineering

#### LAND SLIDES

#### CALIFORNIA STATE GOVERNMENT - SACRAMENTO

- 9.0006 SUBAUDIBLE ROCK NOISE (SARN) AND ASSURANCE OF SLOPE STABILITY, CALIFORNIA  
R. MEARN, State Div. of Highways

#### ILLINOIS STATE GOVERNMENT - SPRINGFIELD

- 9.0011 ENGINEERING GEOLOGY - ILLINOIS  
W.C. SMITH, State Geol. Survey

#### KENTUCKY STATE GOVERNMENT - FRANKFORT

- 9.0015 LANDSLIDES - KENTUCKY  
C.T. GORMAN, State Bur. of Highways

#### MICHIGAN STATE GOVERNMENT - LANSING

- 9.0016 SLOPE STABILITY OF CUTS IN ONONDAGA CLAY  
I.A. ALNOURI, State Dept. of Highways

#### NATL. ACADEMY OF SCIENCES - WASHINGTON

- 9.0010 SHEAR STRENGTH OF FINE-GRAINED SOILS  
WEST POINT, NEW YORK  
UNKNOWN, Transportation Res. Board

#### OHIO STATE GOVERNMENT - COLUMBUS

- 9.0057 LANDSLIPS IN SOUTHEASTERN OHIO  
K.R. EVERETT, Ohio State University, School of Geology
- 9.0059 STABILIZATION OF STEEP LANDS IN OHIO  
G.O. SCHWAB, Ohio State University, School of Geology

#### OHIO STATE UNIVERSITY

SHALLOW TILL SOILS OF SOUTHEAST ALASKA  
D.N. SWANSTON, U.S. Dept. of Agriculture, Pac. N.W.  
For. & Rg. Exp. Sta.

- 9.0062 EROSION AND SEDIMENTATION FOLLOWING  
ROAD CONSTRUCTION AND TIMBER HARVEST ON  
UNSTABLE SOILS IN THREE SMALL WESTERN  
OREGON WATERSHEDS

R.L. FREDRIKSEN, U.S. Dept. of Agriculture, Pac. N.W.  
For. & Rg. Exp. Sta.

U.S. DEPT. OF DEFENSE - AIR FORCE

- 9.0017 CLAY MOBILITY IN RIDGE ROUTE LAND-  
SLIDES, GORMAN, CALIFORNIA

P.F. KERR, Columbia University, School of Arts

- 9.0056 THE INFLUENCE OF CLAY MINERALS ON SUR-  
FICIAL EARTH MOVEMENTS

P.F. KERR, Columbia University, School of Arts

U.S. DEPT. OF DEFENSE - ARMY

- 9.0003 MOBILIZATION OF DEBRIS FLOWS 9973-EN

A.M. JOHNSON, Stanford University, School of Earth  
Sciences

- 9.0021 ROCK STRENGTH FROM FAILURE CASES -  
POWERHOUSE SLOPE STABILITY STUDY, FORT  
PECK DAM, MONTANA

J.V. HAMEL, Hamel Geotechnical Consultants

- 9.0054 ROCK STRENGTH FROM FAILURE CASES

J.F. REDLINGER, U.S. Army, Missouri River Engr. Div.

U.S. DEPT. OF DEFENSE - NAVY

- 9.0004 GENERAL REVIEW OF THE SEISMIC HAZARD  
TO SELECTED U.S. NAVY INSTALLATIONS

J.B. SEED, Calif. Inst. of Technology, Graduate School

- 9.0036 DEFORMATION CHARACTERISTICS OF HILL  
SLOPES & CHANNELWAYS IN 2 DIFFERENT EN-  
VIRONMENTS AS DEPICTED BY REMOTE SENSOR  
RETURNS - CALIFORNIA

D.H. POOLE, Univ. of California, School of Physical  
Sciences

- 9.0063 DEVELOPMENT OF CRITERIA FOR RECOGNIZ-  
ING & IDENTIFYING SLOPE FAILURE FORMS AS  
DEPICTED BY REMOTE SENSOR RETURNS - NORTH  
CAROLINA

D.H. POOLE, East Tenn. State University, Remote Sensing  
Institute

U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT

- 9.0007 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines & Geology

U.S. DEPT. OF INTERIOR - BU. RECLAM.

- 9.0008 RIPRAP SLOPE PROTECTION FOR  
DAMS - A REVIEW OF PRACTICE  
PROCEDURES

F.J. DAVIS, U.S. Dept. of the Interior, Bureau  
of Reclamation

- 9.0047 EVALUATION OF CRITERIA FOR LAND-  
SLIDE ANALYSIS AS PRESENTED IN THE U.S.G.  
BUREAU OF RECLAMATION

U.S. DEPT. OF INTERIOR - BUREAU OF

- 9.0009 LOCATION OF SLOPE FAILURE PLANS  
R.H. MERRILL, U.S. Dept. of the Interior, Bureau  
of Mines

U.S. DEPT. OF INTERIOR - GEOLOGICAL

- 9.0001 REGIONAL GEOLOGIC FRAMEWORK OF THE  
DREAS FAULT - CALIFORNIA

T.W. DIBBLEE, U.S. Dept. of the Interior, Geological  
Survey

- 9.0002 REGIONAL SLOPE STABILITY STUDY IN  
CALIFORNIA AND PENNSYLVANIA  
D.H. RADBRUCH, U.S. Dept. of the Interior, Geological  
Survey

- 9.0027 SANTA CRUZ COUNTY COOP

E.E. BRABB, U.S. Dept. of the Interior, Geological  
Survey

- 9.0028 EARTHQUAKE HAZARD REDUCTION IN THE  
SAN FRANCISCO BAY REGION

E.E. BRABB, U.S. Dept. of the Interior, Geological  
Survey

- 9.0029 GEOLOGY OF THE POINT DUME  
QUADRANGLE AND THE LOS ANGELES COUNTY  
THE TRIUNFO PASS QUADRANGLE, LOS ANGELES  
CO. COOPERATIVE, CALIFORNIA

R.H. CAMPBELL, U.S. Dept. of the Interior, Geological  
Survey

- 9.0030 MONTEREY BAY - CALIFORNIA

H.G. GREENE, U.S. Dept. of the Interior, Geological  
Survey

- 9.0031 ALASKA GEOLOGIC EARTHQUAKE HAZARD  
G. PLAFKER, U.S. Dept. of the Interior, Geological  
Survey

- 9.0032 GEOLOGY OF THE POINT BONITA  
QUADRANGLE, CALIFORNIA

J. SCHLOCKER, U.S. Dept. of the Interior, Geological  
Survey

- 9.0033 ACTIVE FAULTS AND GEOLOGIC HAZARD  
PT. MUGU TO WILMINGTON, CALIFORNIA

H.C. WAGNER, U.S. Dept. of the Interior, Geological  
Survey

- 9.0034 MALIBU BEACH QUADRANGLE  
UNINCORPORATED PART OF THE  
QUADRANGLE, LOS ANGELES COUNTY  
TIVE, CALIFORNIA

- R.F. YERKES*, U.S. Dept. of the Interior, Geological Survey
- 9.0040** SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO  
*G.O. BACHMAN*, U.S. Dept. of the Interior, Geological Survey
- 9.0041** GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA  
*J.M. CATIERMOLE*, U.S. Dept. of the Interior, Geological Survey
- 9.0042** DENVER METROPOLITAN AREA, COLORADO  
*R.M. LINDVALL*, U.S. Dept. of the Interior, Geological Survey
- 9.0043** SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA  
*R.D. MILLER*, U.S. Dept. of the Interior, Geological Survey
- 9.0044** DENVER-FRONT RANGE URBAN CORRIDOR  
*T.W. OFFIELD*, U.S. Dept. of the Interior, Geological Survey
- 9.0045** MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR  
*K.L. PIERCE*, U.S. Dept. of the Interior, Geological Survey
- 9.0046** SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO  
*B. SKIPP*, U.S. Dept. of the Interior, Geological Survey
- 9.0048** HAMILTON 2 DEGREE  
*J.D. WELLS*, U.S. Dept. of the Interior, Geological Survey
- 9.0049** PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY  
*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

U.S. DEPT. OF INTERIOR - O.W.R.T.

- 9.0053** ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI  
*D.M. KEADY*, State Geol. Survey

U.S. DEPT. OF TRANSPORTATION - F.H.A.

- 9.0005** EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA  
*R.A. FORSYTH*, State Div. of Highways
- 9.0013** WATER DRAINAGE FROM IN-PLACE FILLS TO PREVENT OR HALT FILL  
*P.C. CLARK*, State Highway Commission
- 9.0014** INVESTIGATION OF LANDSLIDES ON HIGHWAYS  
*J.H. HAVENS*, State Div. of Res.
- 9.0019** SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS  
*C.J. HAYES*, State Dept. of Highways
- 9.0037** LIME SOIL STABILIZATION STUDY  
*R.A. FORSYTH*, State Div. of Highways
- 9.0038** EVALUATION OF 'ION EXCHANGE' LANDSLIDE CORRECTION TECHNIQUE - CALIFORNIA

- 9.0061** MEASURE AND DEPICT TROUBLE SPOT - OHIO  
*W.F. NORELL*, State Dept. of Transportation

U.S. DEPT. OF TRANSPORTATION - OF

- 9.0018** INVESTIGATION OF RED RIVER GEOLOGY - EFFECTS ON STRUCTURE AND PERFORMANCE  
*D.K. LEER*, State Highway Department
- 9.0022** LANDSLIDE STUDIES IN SOUTH DAKOTA - PORT NO.1 - LOCATION OF AREAS OF LANDSLIDE POTENTIAL IN THE PIERRE  
*J. SCULLY*, State Geol. Survey

U.S. NATL. AERO. & SPACE ADM.

- 9.0035** REMOTE SENSING FOR GEOLOGICAL AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING  
*G. GOODWIN*, U.S. Natl. Aero. & Space Administration Research Center
- 9.0050** REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY  
*J. DENOYER*, U.S. Natl. Aero. & Space Administration

U.S. NATL. SCIENCE FOUNDATION

- 9.0020** FLOW SLIDE CONTROL WITH SLOPE STABILIZATIONS  
*W.L. SCHROEDER*, Oregon State University, School of Engineering
- 9.0025** COLLABORATIVE RESEARCH ON SLOPE PROTECTION FOR EARTH EMBANKMENTS  
*J.K. MITCHELL*, Univ. of California, School of Engineering
- 9.0051** EFFECTS OF DEFORESTATION ON STABILITY OF NATURAL SLOPES - WASHINGTON  
*D.H. GRAY*, Univ. of Michigan, School of Engineering
- 9.0052** EFFECTS OF FOREST CLEAR-CUTTING ON STABILITY OF NATURAL SLOPES  
*D.H. GRAY*, Univ. of Michigan, School of Engineering
- 9.0055** TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH  
*J.F. SHRODER*, Univ. of Nebraska, School of Engineering
- 9.0060** ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO  
*T.H. WU*, Ohio State University, School of Engineering

UNIVERSITY OF ILLINOIS

- 9.0012** STRESS-STRAIN-TIME BEHAVIOR OF ROCK UNDER TRIAXIAL CONDITIONS  
*G. MESRI*, Univ. of Illinois, School of Engineering

## LAND SUBSIDENCE

## FLORIDA STATE GOVERNMENT - TALLAHASSEE

## 10.0028 SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS

B.G. VOLK, Agric. Res. &amp; Educ. Center

## U.S. DEPT. OF DEFENSE - ARMY

## 10.0009 DETECTION OF SUBSURFACE OPENINGS - INDIANA, MISSOURI

E.R. BATES, U.S. Army, Waterways Experiment Station

## 10.0010 STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS

J.G. JACKSON, U.S. Army, Waterways Experiment Station

## 10.0030 VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLGY INVESTIGATIONS - SOILS PHASE)

C.C. CALHOUN, U.S. Army, Waterways Experiment Station

## U.S. DEPT. OF DEFENSE - NAVY

## 10.0002 GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS

J.B. SEED, Calif. Inst. of Technology, Graduate School

## 10.0025 STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I

R.I. LEWELLEN, Arctic Inst. of North America

## U.S. DEPT. OF HOUSING &amp; URBAN DEVELOPMENT

## 10.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, &amp; COSTS OF GEOLOGIC HAZARDS &amp; RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

J.T. ALFORE, State Div. of Mines &amp; Geology

## 10.0033 DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING

UNKNOWN, Unknown Inst. or Indiv. Grant

## U.S. DEPT. OF INTERIOR - BUREAU OF MINES

## 10.0005 DEVELOP METHODS FOR PREDICTING THE COMPONENTS OF GROUND MOVEMENT ABOVE MINE WORKINGS

D.Q. FLETCHER, U.S. Dept. of the Interior, Bureau of Mines

## 10.0006 MICROSEISMIC DETERMINATION OF COAL MINE ENTRY STABILITY

R.D. MUNSON, U.S. Dept. of the Interior, Bureau of Mines

## 10.0007 ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY

## 10.0023 ESTABLISH TECHNIQUES FOR SURFACE SUBSIDENCE OVER MINED AREA

W.J. TESCH, U.S. Dept. of the Interior, Bureau of

## 10.0024 MEASUREMENT AND EVALUATION OF SUBSIDENCE OVER A COAL MINE WITH OVERBURDEN THICKNESS

W.N. YOUNGS, U.S. Dept. of the Interior, Bureau of

## U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY

## 10.0004 COAL MINE DEFORMATION STUDIES - SET, COLORADO

C.R. DUNRUD, U.S. Dept. of the Interior, Geological Survey

## 10.0011 LAND-SURFACE SUBSIDENCE, AREA, TEXAS

R.K. GABRYSCH, U.S. Dept. of the Interior, Geological Survey

## 10.0012 LAND-SURFACE SUBSIDENCE, TARRANT AND SEABROOK AREAS, TEXAS

R.K. GABRYSCH, U.S. Dept. of the Interior, Geological Survey

## 10.0013 CONTINUING QUANTITATIVE WATER STUDIES IN THE HOUSTON DISTRICT

A.G. WINSLOW, U.S. Dept. of the Interior, Geological Survey

## 10.0015 MASS PROPERTIES OF OIL FIELDS - CALIFORNIA

L.A. BEYER, U.S. Dept. of the Interior, Geological Survey

## 10.0016 ALASKA GEOLOGIC EARTHQUAKE HAZARD

G. PLAFKER, U.S. Dept. of the Interior, Geological Survey

## 10.0017 SUBSIDENCE AND RELATED ASPECTS OF GEOTHERMAL SYSTEMS

B.E. LOFGREN, U.S. Dept. of the Interior, Geological Survey

## 10.0018 LAND-SUBSIDENCE STUDIES IN COLORADO TO STUDY THE EXTENT, MAGNITUDE, AND CAUSES

J.F. POLAND, U.S. Dept. of the Interior, Geological Survey

## 10.0019 LAND SUBSIDENCE STUDIES IN JOAQUIN VALLEY - CALIFORNIA

J.F. POLAND, U.S. Dept. of the Interior, Geological Survey

## 10.0020 DENVER URBAN CORRIDOR STUDIES - COLORADO

W.R. HANSEN, U.S. Dept. of the Interior, Geological Survey

## 10.0021 ENGINEERING GEOLOGY RECONSTRUCTION STUDIES OF COASTAL COMMUNITIES, ALABAMA

R.W. LEMKE, U.S. Dept. of the Interior, Geological Survey

## 10.0029 REMOTE SENSING, ALFAFIA AND RIVER BASINS, FLORIDA

A.E. COKER, U.S. Dept. of the Interior, Geological Survey

- 10.0008 STATUS OF LAND SUBSIDENCE DUE TO GROUND-WATER WITHDRAWAL IN MISSISSIPPI  
D.M. KEADY, Mississippi St. University, School of Arts

## U.S. DEPT. OF TRANSPORTATION - F.H.A.

- 10.0014 ARIZONA EARTH FISSURE INVESTIGATION  
C. WINIKKA, State Highway Department
- 10.0027 EARLY DETECTION AND CORRECTION OF SINKHOLE PROBLEMS - ALABAMA  
J.G. NEWTON, U.S. Dept. of the Interior, Geological Survey
- 10.0031 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO  
W.F. NORELL, State Dept. of Transportation

## U.S. NATL. SCIENCE FOUNDATION

- 10.0026 RETURNING UNDERGROUND COAL MINE WASTES TO MINED-OUT VOIDS  
R.A. CARPENTER, Natl. Acad. of Sciences
- 10.0032 CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA  
A.P. DELFLACHE, Lamar University, School of Engineering

## SNOWSTORMS

## U.S. DEPT. OF COMMERCE - N.O.A.A.

- 11.0003 THE MODIFICATION OF GREAT LAKES WINTER STORMS  
H.K. WEICKMANN, U.S. Dept. of Commerce, Atmospheric Phys. & Chem. Lab.
- 11.0004 NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN  
UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.
- 11.0005 SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN  
R.W. HARMS, U.S. Dept. of Commerce, Natl. Weather Service
- 11.0006 A SYNOPTIC CLIMATOLOGY FOR SNOWSTORMS IN NORTHWESTERN NEVADA  
B.L. NELSON, U.S. Dept. of Commerce, Natl. Weather Service
- 11.0009 FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO  
M.F. MILLER, U.S. Dept. of Commerce, Weather Bureau

## U.S. DEPT. OF HOUSING &amp; URBAN DEVELOPMENT

- 11.0001 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR

- 11.0002 SNOW AND ICE DETECTION AND SYSTEMS  
A.I. MCCONE, M B Associates

## U.S. NATL. SCIENCE FOUNDATION

- 11.0007 PHYSICAL EVALUATION OF CLOSURE TECHNIQUES FOR MODIFYING CLOSURE SNOWFALL - THE CASCADE PROJECT  
P.V. HOBBS, Univ. of Washington, School of Earth Sciences
- WYOMING STATE GOVERNMENT - CHIEF OF ENGINEERING
- 11.0008 DETERMINATION OF SNOW FENESTRATION CRITERIA AND DEVELOPMENT OF A SYSTEM FOR SNOW CONTROL  
R.D. TABLER, Rocky Mtn. Forest & Range Station

## TORNADOES

## ILLINOIS STATE GOVERNMENT - SPRINGFIELD

- 12.0017 DENSE RAIN GAGE NETWORK PROJECT - ILLINOIS  
S.A. CHANGNON, State Water Survey
- 12.0033 HYDROMETEOROLOGICAL ANALYSIS OF SEVERE RAINSTORMS - ILLINOIS  
F.A. HUFF, State Water Survey
- 12.0034 STUDY OF THE SYNOPTIC CLIMATE OF NORTH AMERICA  
G. MORGAN, State Water Survey
- TEXAS TECHNOLOGICAL UNIVERSITY - LUBBOCK
- 12.0002 TORNADO - THE VOICE OF THE DISASTER AND AFTER - A STUDY IN RESEARCH INTEGRATION - TEXAS-(LUBBOCK?)  
M.S. MINNIS, Texas Technological University, School of Arts

## U.S. DEPT. OF COMMERCE - E.S.S.

- 12.0038 BEHAVIOR OF WINDS IN THE LOW LEVELS FEET IN CENTRAL OKLAHOMA - JUNE 1967  
K.C. CRAWFORD, U.S. Dept. of Commerce, Natl. Weather Service, Storms Lab.

## U.S. DEPT. OF COMMERCE - N.B.

- 12.0001 DISASTER INVESTIGATIONS  
C.G. CULVER, U.S. Dept. of Commerce, Natl. Weather Service, Standards
- 12.0004 LUBBOCK TORNADO - A SURVEY OF THE DAMAGE IN AN URBAN AREA - TEXAS

12.0005 FEDERAL PLAN FOR METEOROLOGICAL RESEARCH - VICES & SUPPORTING RESEARCH - FISCAL YEAR 1974

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0007 MORPHOLOGY OF TWO TORNADIC STORMS - AN ANALYSIS OF NSSI DATA ON APRIL 30, 1970 - OKLAHOMA CITY, OKLAHOMA

S.L. BARNES, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

12.0008 TORNADO INCIDENCE MAPS

A. COURT, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

12.0009 TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880-1970)

J.Y. VAIKSNORAS, U.S. Dept. of Commerce, Natl. Weather Service

12.0010 ARIZONA 'EDDY' TORNADOES

R.S. INGRAM, U.S. Dept. of Commerce, Natl. Weather Service

12.0012 NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN

R.E. HALLGREN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0013 NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0014 NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN - 1974

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0015 MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971 - A REPORT TO THE ADMINISTRATOR

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0016 WATER WARNINGS AND SPECIALIZED FORECASTS

UNKNOWN, U.S. Air Force, Air Weather Service

12.0020 SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUNDERSTORM AND TORNADO WATCHES WITHIN THE NATIONAL WEATHER SERVICE, EASTERN REGION

M.E. MILLER, U.S. Dept. of Commerce, Weather Bureau

12.0021 TORNADOES

E. KESSLER, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

12.0022 OBSERVATIONS OF SEVERE STORMS ON 26 AND 28 APRIL 1971

C.L. VLECK, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

12.0023 SEVERE STORM MORPHOLOGY - OKLAHOMA

S.L. BARNES, U.S. Dept. of Commerce, Environ. Research Laboratories

12.0024 PAPERS ON OKLAHOMA THUNDERSTORMS, APRIL 29-30, 1970

12.0025 LIFE CYCLE OF FLORIDA KEYS SPOUTS

J.H. GOLDEN, U.S. Dept. of Commerce, Environ. Laboratories

12.0026 DOPPLER RADAR METHODOLOGY OBSERVATION OF CONVECTIVE STORMS

R.M. LHERMITTE, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0027 EM RADIATION-TORNADOES

W. TAYLOR, U.S. Dept. of Commerce, Environ. Laboratories

12.0028 HURRICANE SPAWNED TORNADOES

D.J. NOVLAN, Colorado State University, School of Engineering

12.0030 ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON

T.T. FUJITA, Univ. of Chicago, School of Physics

12.0031 PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY

T.T. FUJITA, Univ. of Chicago, School of Physics

12.0036 DUST DEVIL METEOROLOGY

J.R. COOLEY, U.S. Dept. of Commerce, Natl. Weather Service

12.0037 DAILY TORNADO FREQUENCIES IN THE CONTIGUOUS UNITED STATES

H. GORDON, U.S. Dept. of Commerce, Natl. Weather Service

12.0039 SOME STATISTICAL ASPECTS OF TORNADO SPOUT FORMATION - FLORIDA

J.H. GOLDEN, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

12.0041 COMPUTER SIMULATION OF SEVERE STORMS - OBSERVATIONS WITH DOPPLER RADAR

UNKNOWN, Tetra Tech Incorporated

U.S. DEPT. OF DEFENSE - AIR FORCE

12.0003 THE OCHELTREE TORNADO - A CASE STUDY - MISSOURI

W.E. FINLEY, U.S. Air Force, Environ. Tech. Serv.

12.0029 FORECASTING GUSTY SURFACE WINDS - THE CONTINENTAL UNITED STATES

A.W. WATERS, U.S. Air Force, Air Weather Service

U.S. DEPT. OF DEFENSE - ARMY

12.0040 IMPACT OF THE LUBBOCK STORM ON REGIONAL SYSTEMS - TEXAS

J.E. MINOR, Texas Technological University, School of Engineering

U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT

12.0006 XENIA REBUILDS

UNKNOWN, Xenia Commission

**12.0011 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

*J.T. ALFORE*, State Div. of Mines & Geology

**U.S. NATL. SCIENCE FOUNDATION**

**12.0018 WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS**

*J.W. REED*, Mass. Inst. of Technology, School of Engineering

**12.0019 NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS**

*R.A. GENTRY*, U.S. Atomic Energy Commission, Los Alamos Scientific Lab.

**12.0032 STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS**

*S.A. CHANGNON*, State Water Survey

**UNIVERSITY OF ILLINOIS**

**12.0035 PROBABILISTIC MODELING OF EXTREME LOADS**

*Y.K. WEN*, Univ. of Illinois, School of Engineering

**TSUNAMIS**

**U.S. DEPT. OF COMMERCE - N.O.A.A.**

**13.0004 TSUNAMI RESEARCH**

*S.T. ALGERMISSEN*, U.S. Dept. of Commerce, Environ. Research Laboratories

**13.0005 TSUNAMI RESEARCH**

*G.R. MILLER*, U.S. Dept. of Commerce, Environ. Research Laboratories

**13.0007 WAVE REPORTING PROCEDURES FOR TIDE OBSERVERS IN THE TSUNAMI WARNING SYSTEM**

*M.G. SPAETH*, U.S. Dept. of Commerce, Natl. Ocean Survey

**13.0008 TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION**

*UNKNOWN*, U.S. Dept. of Commerce, Natl. Ocean Survey

**13.0020 NUMERICAL SIMULATION OF TSUNAMIS**

*C.L. MADER*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

**13.0022 RELATIVE SPECTRA OF TSUNAMIS**

*G.R. MILLER*, Univ. of Hawaii, Hawaii Inst. of Geophysics

**13.0023 RECENT TSUNAMI THEORY**

*R.W. PREISENDORFER*, Univ. of Hawaii, Hawaii Inst. of Geophysics

**13.0024 TSUNAMI SHORELINE TRACT**

*G.P. WOOLLARD*, Univ. of Hawaii, Hawaii Inst. of Geophysics

**U.S. DEPT. OF DEFENSE - ARMY**

**13.0001 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA**

*C. PETRAUSKAS*, Univ. of California, School of Engineering

**13.0009 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION**

*A.M. KAMEL*, U.S. Army, Waterways Experiment Station

**13.0010 STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION**

*N.R. OSWALT*, U.S. Army, Waterways Experiment Station

**13.0019 LONG-PERIOD WAVES AND SURGES**

*UNKNOWN*, U.S. Army, Coastal Engin. Res. Center

**13.0026 THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL**

*G.H. KEULEGAN*, U.S. Army, Waterways Experiment Station

**13.0027 A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL**

*G.H. KEULEGAN*, U.S. Army, Waterways Experiment Station

**13.0028 TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY**

*R.W. WHALIN*, U.S. Army, Waterways Experiment Station

**13.0029 THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING DEPTH - OFF-SHORE BEHAVIOR**

*E. VARLEY*, Lehigh University, Ctr. For the Appl. of Math.

**U.S. DEPT. OF DEFENSE - NAVY**

**13.0002 GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS**

*J.B. SEED*, Calif. Inst. of Technology, Graduate School

**13.0016 NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES**

*J.W. MILES*, Univ. of California, Inst. of Geophys. & Pla. Phys.

**U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT**

**13.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

*J.T. ALFORE*, State Div. of Mines & Geology

**U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY**

**13.0011 TSUNAMI SYSTEMS ENGINEERING - NEW**



## TSUNAMIS

- G. PLAFKER*, U.S. Dept. of the Interior, Geological Survey
- 13.0014 ACTIVE FAULTS AND GEOLOGIC HAZARDS,  
PT. MUGU TO WILMINGTON, CALIFORNIA  
*H.C. WAGNER*, U.S. Dept. of the Interior, Geological Survey
- 13.0017 ENGINEERING GEOLOGY RECONNAISSANCE  
STUDIES OF COASTAL COMMUNITIES, ALASKA  
*R.W. LEMKE*, U.S. Dept. of the Interior, Geological Survey
- 13.0018 RECONNAISSANCE ENGINEERING GEOLOGY  
OF THE SITKA AREA, ALASKA  
*J.T. MCGILL*, U.S. Dept. of the Interior, Geological Survey

### U.S. DEPT. OF INTERIOR - O.W.R.T.

- 13.0006 TRANS-ALASKA PIPELINE - SUPPLEMENTAL  
EXHIBITS AND TESTIMONY - VOLUME V  
UNKNOWN, U.S. Dept. of the Interior

### U.S. NATL. SCIENCE FOUNDATION

- 13.0012 EVALUATION OF LONG PERIOD SURFACE  
WAVES IN THE GULF OF ALASKA  
*T.C. ROYER*, Univ. of Alaska, Inst. of Marine Sciences
- 13.0015 TSUNAMI RESEARCH AND ENGINEERING AP-  
PLICATIONS  
*L. HIWANG*, Tetra Tech Incorporated
- 13.0021 PACIFIC TSUNAMI CATALOG  
*D.C. COX*, Univ. of Hawaii, School of Arts

## VOLCANOES

### U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT

- 14.0001 VOLCANIC HAZARDS ON THE ISLANDS OF  
HAWAII  
*D.R. MULLINEAUX*, U.S. Dept. of the Interior, Geological Survey
- 14.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)  
*J.T. ALFORE*, State Div. of Mines & Geology

### U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY

- 14.0002 SATELLITE VOLCANO SURVEILLANCE -  
ALASKA, HAWAII AND WASHINGTON  
*P.L. WARD*, U.S. Dept. of the Interior, Geological Survey
- 14.0004 HAWAIIAN VOLCANO OBSERVATORY  
*D.W. PETERSON*, U.S. Dept. of the Interior, Geological Survey
- 14.0006 GEODIMETER STUDIES OF CASCADE VOL-  
CANOES - WASHINGTON, OREGON AND CALIFOR-  
NIA  
*D.A. SWANSON*, U.S. Dept. of the Interior, Geological Sur-

## SUPPORTING

- 14.0008 THERMAL SURVEILLANCE OF  
REMOTE SENSING OF LONG VALLEY  
MAI, PROGRAM - WASHINGTON,  
CALIFORNIA  
*J.D. FRIEDMAN*, U.S. Dept. of the Interior, Geological Survey
- 14.0010 VOLCANIC HAZARDS, ISLAND  
*D.R. MULLINEAUX*, U.S. Dept. of the Interior, Geological Survey
- 14.0011 EASTERN SNAKE RIVER PLAIN  
VESTIGATIONS - IDAHO  
*S.S. ORIEL*, U.S. Dept. of the Interior, Geological Survey
- 14.0012 SNAKE RIVER PLAIN, PART F  
TRAL - IDAHO  
*D. SCHLEICHER*, U.S. Dept. of the Interior, Geological Survey
- 14.0013 SNAKE RIVER PLAIN, PART  
ROCKS - IDAHO  
*P.L. WILLIAMS*, U.S. Dept. of the Interior, Geological Survey
- 14.0014 REGIONAL VOLCANOLOGY  
UNITED STATES INCLUDING ALASKA  
*R.L. SMITH*, U.S. Dept. of the Interior, Geological Survey

### U.S. DEPT. OF INTERIOR - O. W. R. T.

- 14.0015 RAINWATER CONTAMINATION  
VOLATILES FROM KILAUEA VOL-  
(PHASE I)  
*J.B. FINLAYSON*, Univ. of Hawaii, Research Ctr.

### U.S. NATL. AERO. & SPACE

- 14.0009 THERMAL SURVEILLANCE OF  
CANOES  
*J.D. FRIEDMAN*, U.S. Dept. of the Interior, Geological Survey

### U.S. NATL. SCIENCE FOUNDATION

- 14.0005 SEISMIC SURVEILLANCE OF  
DOUBT AND SPURR VOLCANOES  
ALASKA  
*J. KIENLE*, Univ. of Alaska, Geophysical
- 14.0016 SEISMIC ACTIVITY OF THE  
CANOES  
*S.W. SMITH*, Univ. of Washington, School of

## WATER EROSION

### FLORIDA STATE GOVERNMENT - T

- 15.0016 COASTAL ENGINEERING STUDIES  
TO FLORIDA'S SHORELINE AND E  
PROBLEMS  
*J.A. PURPURA*, Univ. of Florida, School of

## NEW YORK OCEAN SCI. LAB. - MONTAUK, N.Y.

- 15.0028 GROIN STUDY ON THE NORTH SHORE OF  
SUFFOLK COUNTY, LONG ISLAND, NEW YORK,  
BETWEEN ORIENT POINT AND PORT JEFFERSON  
HARBOR  
*T. OMHOLT*, New York Ocean Science Lab

## OHIO STATE GOVERNMENT - COLUMBUS

- 15.0030 SHORE EROSION STUDY OF ERIE COUNTY,  
OHIO  
*L.L. BRAIDECHE*, State Div. of Geolog. Survey
- 15.0031 SHORE EROSION STUDY OF LAKE COUNTY,  
OHIO  
*L.L. BRAIDECHE*, State Div. of Geolog. Survey
- 15.0032 SHORE EROSION STUDIES ALONG THE OHIO  
SHORE OF LAKE ERIE  
*C.H. CARTER*, State Div. of Geolog. Survey

## U.S. DEPT. OF AGRICULTURE

- 15.0034 EROSION AND SEDIMENTATION FOLLOWING  
ROAD CONSTRUCTION AND TIMBER HARVEST ON  
UNSTABLE SOILS IN THREE SMALL WESTERN  
OREGON WATERSHEDS  
*R.L. FREDRIKSEN*, U.S. Dept. of Agriculture, Pac. N.W.  
For. & Rg. Exp. Sta.

## U.S. DEPT. OF AGRICULTURE - F.S.

- 15.0002 FLOOD AND SEDIMENT REDUCTION IN STEEP  
UNSTABLE BRUSSLANDS OF THE SOUTHWEST  
*R.M. RICE*, U.S. Dept. of Agriculture, Pac. S.W. For. &  
Rg. Exp. Sta.

## U.S. DEPT. OF COMMERCE - N.O.A.A.

- 15.0001 COMPOSITE MATERIALS FOR OCEAN CON-  
STRUCTION  
*A.S. TETELMAN*, Univ. of California, School of Engineering
- 15.0017 A STUDY OF NEARSHORE PROCESSES IN  
SOUTHEAST FLORIDA  
*C. EMILIANI*, Univ. of Miami, School of Marine Science
- 15.0026 COASTAL ZONE AND SHORELANDS MANAGE-  
MENT - GREAT LAKES  
*J.M. ARMSTRONG*, Univ. of Michigan, School of Engineer-  
ing
- 15.0027 ENVIRONMENTAL GEOMORPHIC STUDY OF  
THE COASTAL REGIMES ALONG THE SOUTH  
SHORE OF LONG ISLAND - NEW YORK  
*D.R. COATES*, State University of New York, School of  
Arts
- 15.0029 EROSION AND DEPOSITION IN THE SOUNDS  
AND ESTUARIES OF THE NORTH CAROLINA  
COAST  
*R.L. INGRAM*, Univ. of North Carolina, School of Arts

## U.S. DEPT. OF DEFENSE - ARMY

- 15.0004 CONCRETE BLOCK REVELMENT  
BENEDICT, MARYLAND  
*J.V. HALL*, U.S. Army, Coastal Engin. Res. Center
- 15.0006 BAL HARBOUR, FLORIDA PARTIAL  
RESTORATION, BEACH EROSION CONTROL  
HURRICANE PROTECTION PROJECT, DALLAS  
COUNTY, FLORIDA  
*UNKNOWN*, U.S. Army, Engineer District
- 15.0007 JEKYLL ISLAND, GEORGIA, BEACH  
CONTROL AND HURRICANE PROTECTION  
*UNKNOWN*, U.S. Army, Engineer District
- 15.0009 STATEN ISLAND BEACH EROSION  
CONTROL AND HURRICANE PROTECTION PROJECT  
ISLAND, NEW YORK  
*UNKNOWN*, U.S. Army, Engineer District
- 15.0010 BEACH EROSION PROJECT, DELAWARE  
COAST PROTECTION PROJECT, DELAWARE  
*UNKNOWN*, U.S. Army, Engineer District
- 15.0011 VIRGINIA BEACH, VIRGINIA - BEACH  
EROSION CONTROL AND HURRICANE PROTECTION  
*UNKNOWN*, U.S. Army, Engineer District
- 15.0015 COASTAL WORKS EVALUATION -  
FLORIDA  
*UNKNOWN*, U.S. Army, Coastal Engin. Res. Center
- 15.0019 NATIONAL SHORELINE STUDY -  
LAKES REGION INVENTORY REPORT  
*UNKNOWN*, U.S. Army, North Central Division
- 15.0021 NATIONAL SHORELINE STUDY - INDIANA  
REPORT - LOWER MISSISSIPPI REGION  
*UNKNOWN*, U.S. Army, Engineer District

## U.S. DEPT. OF DEFENSE - NAVY

- 15.0014 SHORT-TERM CLIMATE CHANGE  
COASTAL EROSION, BARROW, ALASKA  
*J.D. HUME*, Arctic Inst. of North America
- 15.0022 OFFSET COASTAL INLETS - FORMS  
SEDIMENT ACCUMULATION IN THE BEACH  
ALASKA, NEW ENGLAND  
*M.O. HAYES*, Univ. of Massachusetts, Coastal  
Center
- 15.0024 SIMULATION MODEL FOR STORM  
AND BEACH EROSION ON LAKE MICHIGAN  
*R.A. DAVIS*, Williams College, Graduate School
- 15.0025 PROFILE OF A STORM - WIND, WAVE  
EROSION ON THE SOUTHEASTERN SHORE OF  
LAKE MICHIGAN  
*W.T. FOX*, Williams College, Graduate School

## U.S. DEPT. OF HOUSING &amp; URBAN DEVELOPMENT

- 15.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA

## U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY

## 15.0013 SAN FRANCISCO BAY

*D. McCULLOUGH*, U.S. Dept. of the Interior, Geological Survey

## 15.0023 SEA-CLIFF EROSION STUDIES, MASSACHUSETTS

*C.A. KAYE*, U.S. Dept. of the Interior, Geological Survey

## 15.0037 TEXAS BARRIER ISLANDS

*R.E. HUNTER*, U.S. Dept. of the Interior, Geological Survey

## 15.0039 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA

*UNKNOWN*, U.S. Dept. of the Interior, Geological Survey

## U.S. DEPT. OF INTERIOR - O. WTR. RES. CEN.

## 15.0018 DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS

*P. FAN*, Univ. of Hawaii, Water Resources Research Ctr.

## 15.0033 EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC FACTORS INFLUENCING EROSION OF THE OREGON COAST

*J.P. BYRNE*, Oregon State University, School of Science

## 15.0038 ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT

*W.P. WAGNER*, Univ. of Vermont, State Resources Res. Center

## U.S. DEPT. OF INTERIOR - O.W.R.T.

## 15.0008 PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDEFLATS' IN IOWA'S LARGE RESERVOIR SYSTEMS

*J.A. WILSON*, Iowa State University, Water Resources Research Inst.

## U.S. NATL. AERO. &amp; SPACE ADM.

## 15.0005 KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA

*A.J. MEHTA*, Univ. of Florida, School of Engineering

## U.S. NATL. SCIENCE FOUNDATION

## 15.0012 HYDRAULIC EROSION OF SOILS

*K. ARULANANDAN*, Univ. of California, School of Engineering

## 15.0035 PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET

*C. MASON*, Texas A & M University System, Graduate School

## MULTIPLE HAZARDS

## NATL. ACADEMY OF SCIENCES - WASHINGTON

## 16.0064 FIELD STUDIES OF DISASTER BEHAVIOR INVENTORY

*UNKNOWN*, Natl. Acad. of Sciences

## 16.0065 TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES

*UNKNOWN*, Natl. Acad. of Sciences

## NO FORMAL SUPPORT REPORTED

## 16.0001 EMERGENCY OPERATIONS DEVELOPMENT - CIVIL DEFENSE RESCUE

*L.C. THOMAS*, Stanford Research Institute

## 16.0004 PROBING THE LAW AND BEYOND - FOR PUBLIC PROTECTION FROM HAZARDOUS PRODUCT CATASTROPHES

*J.M. BROWN*, George Washington University, Pr. Stud. Sci. Tech.

## 16.0017 THE SALVATION ARMY - ITS STRUCTURE, OPERATIONS, AND PROBLEMS IN DISASTER

*J.L. ROSS*, Ohio State University, Disaster Research Center

## 16.0019 RECOVERY FROM NATURAL DISASTERS - SURANCE OR FEDERAL AID

*UNKNOWN*, Univ. of Pennsylvania, School of Civil Engineering

## 16.0036 PLAN FOR AN IMPROVED COMMUNICATION SYSTEM SERVING THE EMERGENCY SERVICES DEPARTMENTS OF THE CITY OF LOS ANGELES (BREV)

*UNKNOWN*, Hughes Aircraft Company

## 16.0039 IMPROVED OUTDOOR ALERTING AND COMMUNICATIONS

*R.L. LAMOUREUX*, System Development Corporation

## 16.0040 REGULATION OF GREAT LAKES LEVELS - A SUMMARY REPORT/1974

*UNKNOWN*, Internat. Joint Commission

## 16.0041 REGULATION OF GREAT LAKES LEVELS REPORT TO THE INTERNATIONAL COMMISSION BY THE INTERNATIONAL LAKES LEVELS BOARD

*UNKNOWN*, Internat. Joint Commission

## 16.0076 NATIONAL ATMOSPHERIC SCIENCE PROGRAM - FISCAL YEAR 1974

*UNKNOWN*, U.S. Exec. Office of the Pres., Off. of Science & Technology

## 16.0097 THE POLICE DEPARTMENT IN NATURAL DISASTER OPERATIONS

*J.M. BROOKS*, Ohio State University, Disaster Research Center

## 16.0099 THE WARNING SYSTEM IN DISASTERS - A SELECTIVE ANALYSIS

*B.F. MCLUCKIE*, Ohio State University, Disaster Research Center

## 16.0104 ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COASTAL ZONE, GALVESTON-HOUSTON AREA

*W.L. FISHER*, Univ. of Texas, Bureau of Economic Geology

## OHIO STATE GOVERNMENT - COLUMBUS

**16.0016 ANALYSIS OF EMERGENCY MEDICAL SERVICES COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL SUBDIVISIONS***R.C. CHASE*, Ohio State University, School of Medicine

R. W. JOHNSON FOUND. - NEW BRUNSWICK, N.J.

**16.0029 A NATIONWIDE PROGRAM TO DEVELOP REGIONAL EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS***D. MCCONNAUGHEY*, Natl. Acad. of Sciences

## TEXAS A. &amp; M. UNIVERSITY SYSTEM

**16.0024 THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL CARE SYSTEMS***D.P. SKOGMAN*, Texas A & M University System, School of Engineering

## U.S. DEPT. OF AGRICULTURE - C.S.R.S.

**16.0021 MANAGEMENT OF INSURABLE RISK***M.B. BADENHOP*, Univ. of Tennessee, Agricultural Experiment Sta.

## U.S. DEPT. OF COMMERCE - E.S.S.A.

**16.0043 ESSA AND OPERATION FORESIGHT***UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

## U.S. DEPT. OF COMMERCE - N.B.S.

**16.0030 NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS***G.T. SAV*, U.S. Dept. of Commerce, Natl. Bureau of Standards**16.0073 BUILDING PRACTICES FOR DISASTER MITIGATION***R.N. WRIGHT*, U.S. Dept. of Commerce, Natl. Bureau of Standards

## U.S. DEPT. OF COMMERCE - N.O.A.A.

**16.0045 SUMMARY REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971***R.C. KOCH*, Geomet Incorporated**16.0046 FEDERAL PLAN FOR WEATHER RADARS***UNKNOWN*, U.S. Dept. of Commerce, National Weather Service**16.0066 WEATHER & CLIMATE MODIFICATION PROBLEMS AND PROGRESS***UNKNOWN*, Natl. Acad. of Sciences**16.0067 WEATHER SATELLITE CAPABILITIES - PRESENT AND FUTURE***R.L. PYLE*, U.S. Dept. of Commerce, Natl. Environ. Satel-**16.0069 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1973***UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.**16.0070 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1975***UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.**16.0071 A FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS***UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.**16.0072 PLAN TO IMPROVE LOCAL WEATHER FORECASTS***UNKNOWN*, U.S. Dept. of Commerce, Off. of Plans & Programs**16.0090 WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971***UNKNOWN*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.**16.0091 CLIMATES OF THE STATES - CLIMATE OF NEW YORK***A.B. PACK*, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.**16.0092 OPERATIONS OF THE NATIONAL WEATHER SERVICE***UNKNOWN*, U.S. Dept. of Commerce, National Weather Service

## U.S. DEPT. OF DEFENSE - ARMY

**16.0007 MILITARY BLOOD BANKING (CIVIL DISASTERS)***F.R. CAMP*, U.S. Army, Medical Research Laboratory**16.0008 BODY RECOVERY DOG***W.L. QUINN*, U.S. Army, Land Warfare Laboratory**16.0026 DEBRIS CLEARING TIMES AFFECTING CRITICAL SURVIVAL ACTIONS***T.N. WILLIAMSON*, Jacobs Associates**16.0027 IMPROVISING ELECTRIC POWER FROM INDUCTION GENERATORS DURING PROLONGED POWER OUTAGES***R.H. BLACK*, U R S Systems Corporation**16.0033 COMMUNICATIONS IN NATURAL DISASTERS***R.A. STALLINGS*, Ohio State University, Disaster Research Center**16.0037 OPTIMUM UTILIZATION OF GOVERNMENT AND NON-GOVERNMENT COMMUNICATIONS RESOURCES***A.W. WIEGANT*, Stanford Research Institute**16.0044 MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS***M.M. STEPHENS*, U.S. Dept. of the Interior, Office of Oil

16.0053 NATURAL DISASTER OPERATIONS PLANNING  
C.T. RAINY, Stanford Research Institute

16.0057 ON ESTIMATION OF MAXIMUM WIND SPEEDS  
IN TORNADOES AND HURRICANES  
P. DERGARABEDIAN, T R W Incorporated

16.0059 EMERGENCY OPERATIONS CONTINGENCY  
PLANNING - NEW ORLEANS, LOUISIANA  
A.I. ABERSMAN, System Development Corporation

16.0060 DEVELOPMENT OF IMPROVED EMERGENCY  
OPERATIONS SIMULATION TRAINING (EOST)  
TRAINING PROCEDURES  
R.C. HARKER, System Development Corporation

16.0078 LABORATORY STUDIES OF THE EFFECTS OF  
PHYSICAL HAZARD ON SHELTER MANAGEMENT  
BEHAVIOR - PHASE I - STUDY PLAN  
T.R. ARMSTRONG, Amer. Inst. For Res.

16.0079 THE INVESTIGATION OF SHELTER MANAGE-  
MENT AND CONTROL IN NATURAL DISASTER  
R.A. COLLINS, Amer. Inst. For Res.

16.0085 AN ANALYSIS OF OPERATING SYSTEM EF-  
FECTIVENESS - FOCUS ON THE BEHAVIOR OF  
LOCAL COORDINATORS  
C.T. GRIFFIN, Iowa State University, School of Science

16.0086 ROLE PERFORMANCE IN THE OPERATING  
SYSTEM - CIVIL DEFENSE OPERATIONS IN DIS-  
ASTER  
C.L. MULFORD, Iowa State University, School of Science

16.0087 SECURING COMMUNITY RESOURCES FOR SO-  
CIAL ACTION  
C.L. MULFORD, Iowa State University, School of Science

16.0098 A PERSPECTIVE ON DISASTER PLANNING  
R.R. DYNES, Ohio State University, Disaster Research  
Center

16.0101 DISASTER RELIEF - DOMESTIC ACTION IN  
THE SPOTLIGHT  
E.J. RUSH, U.S. Army, War College

16.0107 EXPEDIENT AM AND FM BROADCAST AN-  
TENNAS  
D.E. PAULEY, Gautney & Jones Comm. Inc.

16.0108 AREA-WIDE DISASTER RESPONSE - CIVIL  
PREPAREDNESS AND REGIONAL COUNCILS  
R.J. MARSHAK, Human Sciences Research Inc.

#### U.S. DEPT. OF DEFENSE - D.S.A.

16.0106 SOIL POLLUTION - EROSION EFFECTS IN SOIL  
UNKNOWN, U.S. Dept. of Defense, Defense Documenta-  
tion Center

#### U.S. DEPT. OF DEFENSE - NAVY

16.0010 SEARCH AND RESCUE COMMUNICATION--  
GLOBAL RESCUE ALARM NET (GRAN)  
W.R. CRAWFORD, U.S. Navy, Air Test Center

#### U.S. DEPT. OF HLTH. ED. & WEL.

16.0002 CONSULTATIVE PSYCHIATRIC  
INDIVIDUALS AND COMMUNITY  
AGENCIES IN RAPID CITY, SOUTH DA  
C.L. KEENER, Unknown Inst. or Indiv. Grant

16.0006 A SIMULATION MODEL FOR  
MEDICAL SYSTEMS  
H.E. SMALLEY, Georgia Inst. of Tech  
Systems Research Center

16.0011 PUBLIC HEALTH SERVICE  
ASSISTANCE REPORT JULY 1967-JUN  
UNKNOWN, U.S. Dept. of Hlth. Ed. & W  
Serv. & M.H. Adm.

16.0018 SYSTEMS ANALYSIS OF EMER  
DELIVERY  
W.F. HAMILTON, Univ. of Pennsylvania  
Medicine

16.0100 ORGANIZATIONAL RESPONSES  
COMMUNITY CRISES  
E.L. QUARANTELLI, Ohio State University  
Social Science

#### U.S. DEPT. OF HOUSING & URBAN DEV.

16.0005 THE FEDERAL RESPONSE TO  
STORM AGNES: A REPORT TO THE  
MITTEE ON PUBLIC WORKS, SUBCOM  
DISASTER RELIEF  
UNKNOWN, U.S. Exec. Office of the Pres  
gency Preparedness

16.0023 DESIGN TO ESTABLISH A FE  
FOR EMERGENCY MEDICAL CARE  
METROPOLITAN NASHVILLE-MIDDLE  
REGION  
C.E. GOSHEN, Urban Obs. of Met. Nashville

16.0025 URBAN GEOLOGY - PLAN FOR  
THE NATURE, MAGNITUDE, AND  
GEOLOGIC HAZARDS AND RECOM  
FOR THEIR MITIGATION (ABBREV)  
UNKNOWN, State Div. of Mines & Geology

16.0038 URBAN GEOLOGY PLAN FOR  
THE NATURE, MAGNITUDE, & COSTS  
IC HAZARDS & RECOMMENDATION  
MITIGATION (ABBREV)  
J.T. ALFORE, State Div. of Mines & Geology

16.0050 PUBLIC SAFETY SUBSYSTEM  
ANALYSIS OVERVIEW  
UNKNOWN, Unknown Inst. or Indiv. Grant

16.0051 PUBLIC SAFETY SUBSYSTEM  
TUALIZATION TASK COMPLETION RE  
UNKNOWN, Unknown Inst. or Indiv. Grant

16.0058 THE SEISMIC SAFETY STUDY  
GENERAL PLAN  
D. ARMSTRONG, Tri Cities Seismic Safe. S

16.0080 SARASOTA - ZONING AND SUBDIVISION CONTROLS REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS  
E.R. BARTLEY, Tampa Bay Regional Plan. Comm.

16.0081 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS  
UNKNOWN, Stephenson Co. Planning Comm.

16.0083 ZONING ORDINANCE - KNOX COUNTY, INDIANA  
UNKNOWN, Clyde E. Williams & Assoc. Inc

16.0088 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY  
UNKNOWN, State Program Dev. Office

16.0089 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY  
UNKNOWN, State Program Dev. Office

16.0093 RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969  
J. BLACKWELL, State Dept. of Community Affs.

16.0095 COMPREHENSIVE PLAN - REPORT C, IMPLEMENTATION - VILLAGE OF EAST AURORA, N.Y., TOWN OF AURORA, N.Y.  
UNKNOWN, Aurora Planning Board

16.0096 THE CHARLOTTE CONSORTIUM TASK I REPORT - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM  
UNKNOWN, Unknown Inst. or Indiv. Grant

16.0102 MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN  
UNKNOWN, State Planning & Grants Div.

16.0103 THE WICHITA FALLS CONSORTIUM PHASE I REPORT - VOLUME III - ANALYSIS OF MUNICIPAL ACTIVITIES - SECTION IV - PUBLIC SAFETY SUBSYSTEM  
UNKNOWN, Unknown Inst. or Indiv. Grant

#### U.S. DEPT. OF INTERIOR - GEOLOGICAL SURVEY

16.0054 ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT  
D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey

16.0055 GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA  
E.H. PAMPEYAN, U.S. Dept. of the Interior, Geological Survey

16.0056 SOIL ENGINEERING RESEARCH - CALIFORNIA  
T.L. YOUNG, U.S. Dept. of the Interior, Geological Survey

16.0074 SEISMIC HAZARDS AND LAND-USE PLANNING  
D.R. NICHOLS, U.S. Dept. of the Interior, Geological Survey

#### U.S. DEPT. OF INTERIOR - O.W.R.T

16.0084 ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE  
J.R. BARNARD, Iowa State University, Water Resources Research Inst.

#### U.S. DEPT. OF JUSTICE

16.0042 EMERGENCY EQUIPMENT STANDARDS  
A.T. HORTON, U.S. Dept. of Commerce, Natl. Bureau of Standards

#### U.S. DEPT. OF TRANSPORTATION - COAST GUARD

16.0009 GLOBAL RESCUE ALARM NETWORK (GRAN)  
P. VILLONE, U.S. Natl. Aero. & Space Adm., Goddard Space Flight Center

16.0015 DEVELOPMENT OF A DISTRESS ALERTING AND LOCATING SYSTEM (DALIS) FOR SEARCH AND RESCUE MISSION  
UNKNOWN, Beukers Laboratories Inc.

#### U.S. DEPT. OF TRANSPORTATION - F.H.A.

16.0012 HELICOPTER AMBULANCE SERVICE TO EMERGENCIES  
UNKNOWN, State Dept. of Health

16.0013 COORDINATED ACCIDENT RESCUE EFFORT, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES  
J.E. CLARK, Mississippi St. University, School of Engineering

16.0014 CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20)  
D.G. PENTERMAN, State Off. of the Adj. Gen.

16.0031 EVALUATION OF EMERGENCY CALL SYSTEMS  
R.H. EMERY, U.S. Dept. of Transportation, Federal Highway Administration

16.0035 NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES  
SKOG, State Highway Department

#### U.S. DEPT. OF TRANSPORTATION - N.H.T.S.A.

16.0003 DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION  
UNKNOWN, Dunlap & Associates Inc.

#### U.S. DEPT. OF TRANSPORTATION - OFF. SEC.

U.S. DEPT. OF TRANSPORTATION - U.M.T.A.

- 16.0034 DESIGN AND IMPLEMENT A TRANSIT SYSTEM  
FOLLOWING A NATURAL DISASTER  
UNKNOWN, Luzerne Co. Transp. Authority

U.S. EXECUTIVE OFFICE - O.E.P.

- 16.0077 REPORT TO THE CONGRESS - DISASTER  
PREPAREDNESS  
UNKNOWN, U.S. Exec. Office of the Pres., Off. of Emer-  
gency Preparedness

U.S. NATL. AERO. & SPACE ADM.

- 16.0047 A DIGITAL SIMULATION OF MESSAGE TRAF-  
FIC FOR NATURAL DISASTER WARNING COMMU-  
NICATIONS SATELLITE  
G.F. HEIN, U.S. Natl. Aero. & Space Adm., Lewis  
Research Center
- 16.0048 DISASTER WARNING SATELLITE STUDY  
UNKNOWN, U.S. Natl. Aero. & Space Adm., Lewis  
Research Center

U.S. NATL. SCIENCE FOUNDATION

- 16.0022 EVALUATION OF POLICY-RELATED

RESEARCH IN THE FIELD  
SYSTEMS, OPERATIONS, AND SER-  
VICE MEDICAL SERVICES

H. PLAAS, Univ. of Tennessee, School of

- 16.0028 ASSESSMENT OF RESEARCH  
HAZARDS

J.E. HAAS, Univ. of Colorado, School of

- 16.0061 A COMPARATIVE ANALYSIS  
PORT OF AND RESISTANCE TO W-  
CATION PROJECTS

J.E. HAAS, Univ. of Colorado, Graduate

- 16.0062 UNIVERSITY-INDUSTRY W-  
HAZARDS AND DAMAGE RELATED  
EARTH MATERIALS

D. RICHARD, Univ. of Denver, Graduate

- 16.0082 CLIMATOLOGICAL ASSESSM-  
EFFECTS ON PRECIPITATION - PAR

F.A. HUFF, State Water Survey

- 16.0094 COLLABORATIVE RESEARCH  
HAZARDS

R.W. KATES, Clark University, Graduate

- 16.0109 BUILDING STANDARDS  
EARTHQUAKE HAZARD FOR THE  
BASIN

B. GONEN, Univ. of Washington, School

# PERFORMING ORGANIZATION INDEX

- Agric. Res. & Educ. Center ... *Belle Glade, Florida*, 10.0028.  
 Albuquerque Urban Observatory ... *Albuquerque, New Mexico*, 6.0128.  
 Amer. Inst. for Res. ... *Miami, Florida*, 16.0078, 16.0079.  
 Amer. Soc. of Civil Engrs. ... *New York, New York*, 6.0132, 6.0338, 6.0339.  
 Arctic Inst. of North America ... *Washington, District of Columbia*, 10.0025, 15.0014.  
 Arizona State University ... *Tempe, Arizona*, 1.0007.  
 Atmospherics Incorporated ... *Fresno, California*, 2.0008.  
 Auburn University ... *Auburn, Alabama*, 5.0001, 6.0157.  
 Aurora Planning Board ... *Aurora, New York*, 6.0332, 16.0095.  
 Battelle Memorial Institute ... *Columbus, Ohio*, 3.0265.  
 Battelle Memorial Institute ... *Richland, Washington*, 7.0017.  
 Beukers Laboratories Inc. ... *Smithtown, New York*, 16.0015.  
 Boise State College ... *Boise, Idaho*, 6.0003.  
 Bullitt Co. Planning Comm. ... *Shepherdsville, Kentucky*, 6.0286.  
 Calif. Inst. of Technology ... *Pasadena, California*, 3.0001, 3.0041, 3.0042, 3.0043, 3.0044, 3.0045, 3.0139, 3.0140, 3.0141, 3.0142, 3.0143, 3.0144, 3.0145, 3.0146, 3.0147, 3.0148, 9.0004, 10.0002, 13.0002.  
 Calspan Corporation ... *Buffalo, New York*, 8.0121.  
 Central New York Reg. Pln. Bd. ... *Syracuse, New York*, 6.0133.  
 Clark University ... *Worcester, Massachusetts*, 16.0094.  
 Clatsop Tillamook Intergov. ... *Cannon Beach, Oregon*, 6.0352.  
 Clyde E. Williams & Assoc. Inc. ... *Indianapolis, Indiana*, 6.0268, 16.0083.  
 Coast Code Administration ... *Gulfport, Mississippi*, 8.0010.  
 Colorado State University ... *Fort Collins, Colorado*, 1.0011, 5.0027, 6.0050, 6.0189, 6.0190, 7.0013, 8.0066, 8.0067, 8.0068, 8.0069, 12.0028.  
 Columbia Co. Planning Dept. ... *Hudson, New York*, 6.0333.  
 Columbia University ... *New York, New York*, 9.0017, 9.0056.  
 Columbia University ... *Palisades, New York*, 3.0258, 3.0259, 3.0260, 3.0261, 3.0262, 3.0263.  
 Cornell University ... *Ithaca, New York*, 3.0257, 5.0021, 6.0334, 6.0335.  
 Council on Intergov. Relations ... *Sacramento, California*, 6.0042, 6.0178, 6.0179.  
 Dallas Water Utilities Dept. ... *Dallas, Texas*, 16.0105.  
 Diversified Consultants Inc. ... *Jackson, Mississippi*, 6.0307, 6.0308.  
 Dunlap & Associates Inc. ... *Darien, Connecticut*, 16.0003.  
 East Cent. Florida Reg. Coun. ... *Titusville, Florida*, 6.0072.  
 East Tenn. State University ... *Johnson City, Tennessee*, 9.0063.  
 Eastern Penn. Psych. Institute ... *Philadelphia, Pennsylvania*, 6.0010.  
 Environmental Res. Corporation ... *Las Vegas, Nevada*, 3.0244.  
 Environmental Res. Inst. Mich. ... *Ann Arbor, Michigan*, 6.0298.  
 Fed. City College ... *Washington, District of Columbia*, 6.0016.  
 Flight Test Research Inc. ... *Long Beach, California*, 2.0009.  
 Gautney & Jones Comm. Inc. ... *Falls Church, Virginia*, 16.0107.  
 Genesee Finger Lake Reg. Board ... *Rochester, New York*, 6.0340.  
 Geomet Incorporated ... *Rockville, Maryland*, 16.0045.  
 George Washington University ... *Washington, District of Columbia*, 16.0004.  
 Georgia Inst. of Technology ... *Atlanta, Georgia*, 3.0202, 6.0073, 6.0074, 6.0238, 6.0239, 6.0240, 6.0241, 6.0242, 6.0243, 16.0006.  
 Glendora City Government ... *Glendora, California*, 6.0170, 9.0026.  
 Gulf Univ. Res. Consortium ... *Galveston, Texas*, 8.0049.  
 Hamel Geotechnical Consultants ... *Rapid City, South Dakota*, 9.0021.  
 Harvard University ... *Cambridge, Massachusetts*, 8.0117.  
 Hazleton Nanticoke M.H. & M.R. ... *Nanticoke, Pennsylvania*, 6.0009.  
 Hughes Aircraft Company ... *Fullerton, California*, 16.0036.  
 Human Sciences Research Inc. ... *McLean, Virginia*, 16.0108.  
 Hydrocomp International ... *Palo Alto, California*, 6.0177.  
 IIT Research Institute ... *Chicago, Illinois*, 3.0204, 5.0044.  
 I N T A S A Incorporated ... *Menlo Park, California*, 6.0173, 6.0174, 6.0175.  
 Illinois Inst. for Envir. Qlty ... *Chicago, Illinois*, 6.0083.  
 Inst. for Defense Analysis ... *Arlington, Virginia*, 5.0023, 6.0032, 8.0017.  
 Internat. Joint Commission ... *Washington, District of Columbia*, 6.0052, 16.0040, 16.0041.  
 Iowa State University ... *Ames, Iowa*, 6.0089, 6.0272, 6.0273, 15.0008, 16.0084, 16.0085, 16.0086, 16.0087.  
 Jacobs Associates ... *San Francisco, California*, 16.0026.  
 John A. Blume & Associates ... *San Francisco, California*, 3.0013, 3.0014, 3.0015, 3.0016, 3.0017, 3.0018, 3.0048, 3.0154.  
 John H. Wiggins Company ... *Redondo Beach, California*, 3.0008, 3.0009.  
 Johns Hopkins University ... *Baltimore, Maryland*, 8.0009.  
 Kansas State University ... *Manhattan, Kansas*, 2.0013.  
 Lamar University ... *Beaumont, Texas*, 10.0032.  
 Lehigh University ... *Bethlehem, Pennsylvania*, 13.0029.  
 Lincoln Co. Planning Dept. ... *Newport, Oregon*, 6.0354.  
 Lockwood Andrews & Newman Inc. ... *Houston, Texas*, 6.0385.  
 Los Angeles Co. Bd. of Supvrs. ... *Los Angeles, California*, 3.0004, 3.0101.  
 Louisiana State Univ. Systems ... *Baton Rouge, Louisiana*, 2.0014, 8.0008, 8.0103.  
 Lower Minn. Riv. Wtrshed Dist. ... *Savage, Minnesota*, 6.0302.  
 Luzerne Co. Transp. Authority ... *Wilkes Barre, Pennsylvania*, 16.0034.  
 Luzerne Wyoming Co. M.H. Prog. ... *Wilkes Barre, Pennsylvania*, 6.0011.  
 M B Associates ... *San Ramon, California*, 11.0002.  
 Macon Co. Regional Plan Comm. ... *Decatur, Illinois*, 6.0258.  
 Marion Co. Metrop. Dev. Dept. ... *Indianapolis, Indiana*, 6.0087.  
 Mass. Inst. of Technology ... *Cambridge, Massachusetts*, 3.0026, 3.0061, 3.0062, 3.0063, 3.0064, 3.0226, 3.0227, 3.0228, 3.0229, 3.0230, 6.0107, 12.0018.  
 Mathematica Incorporated ... *Bethesda, Maryland*, 6.0101.  
 Miami Federal Executive Board ... *Miami, Florida*, 8.0026.  
 Michigan State University ... *East Lansing, Michigan*, 5.0014.  
 Middle Georgia Area Plan. Com. ... *Macon, Georgia*, 6.0245.  
 Mississippi Ark. Tenn. Council ... *Memphis, Tennessee*, 3.0069, 3.0269, 3.0270.



Mississippi St. University ...*State College, Mississippi*, 2.0015, 5.0017, 6.0007, 10.0008, 16.0013.

Montana State University ...*Bozeman, Montana*, 1.0004, 1.0005, 1.0013, 6.0125, 6.0126, 6.0321.

Natl. Acad. of Sciences ...*Washington, District of Columbia*, 3.0186, 5.0008, 5.0009, 10.0026, 16.0029, 16.0063, 16.0064, 16.0065, 16.0066.

Natl. Center for Atmosph. Res. ...*Boulder, Colorado*, 7.0010, 7.0011.

Natl. Res. Council ...*Washington, District of Columbia*, 3.0054.

New York Ocean Science Lab. ...*Montauk, New York*, 15.0028.

North Amer. Weather Consult. ...*Goleta, California*, 6.0171.

North Dakota State University ...*Fargo, North Dakota*, 2.0020, 7.0006.

North Kennebec Reg. Pln. Comm. ...*Waterville, Maine*, 6.0288.

Northern Ariz. University ...*Flagstaff, Arizona*, 5.0002.

Northwestern University ...*Evanston, Illinois*, 6.0259.

Oak Ridge National Laboratory ...*Oak Ridge, Tennessee*, 3.0271, 3.0272.

Ocean Data Systems Inc. ...*Rockville, Maryland*, 8.0105.

Ohio State University ...*Columbus, Ohio*, 6.0345, 6.0346, 6.0347, 6.0348, 9.0057, 9.0058, 9.0059, 9.0060, 16.0016, 16.0017, 16.0033, 16.0049, 16.0097, 16.0098, 16.0099, 16.0100.

Ohio University ...*Athens, Ohio*, 3.0264.

Old Dominion University ...*Norfolk, Virginia*, 5.0032.

Oregon State University ...*Corvallis, Oregon*, 6.0353, 9.0020, 15.0033.

Palm Beach Co. Area Plan. Bd. ...*West Palm Beach, Florida*, 6.0235, 6.0236.

Parsons Jurden Corporation ...*New York, New York*, 2.0001.

Penn. State University ...*University Park, Pennsylvania*, 2.0007, 3.0268, 6.0144, 6.0145, 6.0146, 6.0360, 6.0361, 8.0125.

Princeton University ...*Princeton, New Jersey*, 3.0068, 8.0120.

Public Administration Service ...*Chicago, Illinois*, 3.0022.

Purdue University ...*Lafayette, Indiana*, 3.0023, 3.0215, 6.0088, 6.0269, 6.0270, 6.0271, 7.0004, 8.0102.

Resources Development Consult. ...*Fort Collins, Colorado*, 6.0191.

Rocky Mtn. Forest & Range Sta. ...*Laramie, Wyoming*, 11.0008.

Rutgers the State University ...*New Brunswick, New Jersey*, 6.0323, 6.0324.

San Diego Co. Comp. Plan. Org. ...*San Diego, California*, 6.0046, 6.0047.

San Diego Reg. Comp. Pl. Org. ...*San Diego, California*, 6.0181.

Serendipity Incorporated ...*Chatsworth, California*, 16.0052.

Shannon & Wilson Incorporated ...*Seattle, Washington*, 3.0278.

Smithsonian Institution ...*Washington, District of Columbia*, 8.0003.

Smithsonian Institution ...*Cambridge, Massachusetts*, 5.0013.

South Alabama Reg. Plan. Comm. ...*Mobile, Alabama*, 6.0158.

South Dakota State University ...*Brookings, South Dakota*, 6.0030.

Southwestern Ill. Plan. Comm. ...*Collinsville, Illinois*, 6.0084.

St. Louis University ...*St. Louis, Missouri*, 3.0235, 3.0236, 3.0237, 3.0238, 3.0239, 3.0240, 3.0241.

Stanford Research Institute ...*Menlo Park, California*, 16.0001, 16.0037, 16.0053.

Stanford University ...*Palo Alto, California*, 3.0040, 3.0136, 3.0137, 3.0138, 9.0003.

State Bur. of Highways ...*Lexington, Kentucky*, 9.0015.

State Comm. & Area Dev. Div. ...*Jackson, Mississippi*, 6.0200.

State Dept. of Env. Conserv. ...*Albany, New York*, 6.0131.

State Dept. of Health ...*Minneapolis, Minnesota*.

State Dept. of Highways ...*Lansing, Michigan*, 9.0000.

State Dept. of Highways ...*Oklahoma City, Oklahoma*.

State Dept. of Highways ...*Olympia, Washington*, 1.0006, 1.0014.

State Dept. of Pub. Welfare ...*Camp Hill, Pennsylvania*.

State Dept. of Transportation ...*Sacramento, California*.

State Dept. of Transportation ...*Columbus, Ohio*, 10.0031.

State Dept. of Water Resources ...*Sacramento, California*, 3.0046, 6.0044.

State Div. of Comp. Planning ...*Austin, Texas*, 6.0000.

State Div. of Geolog. Survey ...*Columbus, Ohio*, 15.0031.

State Div. of Geolog. Survey ...*Sandusky, Ohio*.

State Div. of Highways ...*Sacramento, California*, 9.0005, 9.0006, 9.0037, 9.0038.

State Div. of Mines & Geology ...*Sacramento, California*, 1.0003, 2.0002, 3.0011, 3.0047, 4.0001, 5.0000, 7.0009, 8.0018, 9.0007, 10.0003, 11.0000, 13.0003, 14.0003, 15.0003, 16.0025, 16.0038.

State Div. of Res. ...*Frankfort, Kentucky*, 9.0014.

State Div. of Voc. Rehab. ...*Charleston, West Virginia*.

State Div. of Water Resources ...*Albany, New York*.

State Geol. Survey ...*University, Alabama*, 6.0030.

State Geol. Survey ...*Urbana, Illinois*, 9.0011.

State Geol. Survey ...*Jackson, Mississippi*, 9.0053.

State Geol. Survey ...*Vermillion, South Dakota*, 9.0000.

State Highway Commission ...*Topeka, Kansas*, 9.0000.

State Highway Commission ...*Augusta, Maine*, 6.0000.

State Highway Department ...*Phoenix, Arizona*, 10.0000.

State Highway Department ...*Little Rock, Arkansas*.

State Highway Department ...*Fargo, North Dakota*.

State Legislature ...*Sacramento, California*, 3.0150.

State Materials & Res. Dept. ...*Sacramento, California*, 3.0152, 9.0039.

State Off. of Plan. Services ...*Albany, New York*, 6.0330.

State Off. of the Adj. Gen. ...*Lincoln, Nebraska*.

State Planning & Com. Aff. Agy ...*Boise, Idaho*.

State Planning & Grants Div. ...*Columbia, Missouri*, 6.0363, 16.0102.

State Planning Board ...*Santurce, Puerto Rico*, 6.0000.

State Planning Commission ...*Nashville, Tennessee*.

State Program Dev. Office ...*Frankfort, Kentucky*, 6.0284, 16.0088, 16.0089.

State Res. & Dev. Center ...*Jackson, Mississippi*, 8.0012.

State University of New York ...*Binghamton, New York*, 15.0027.

State University of New York ...*Ithaca, New York*, 6.0337.

State Water Resour. Board ...*Oklahoma City, Oklahoma*, 6.0350, 6.0351.

State Water Survey ...*Chicago, Illinois*, 2.0011.

State Water Survey ...*Urbana, Illinois*, 2.0012, 7.0008, 12.0017, 12.0032, 12.0033, 12.0034, 16.0082.

Stephenson Co. Planning Comm. ...*Freeport, Maine*, 16.0081.

Stone & Webster Engin. Corp. ...*Boston, Massachusetts*.

Tampa Bay Regional Plan. Coun. ...*St. Petersburg, Florida*, 6.0231, 6.0232, 16.0080.  
 Tetra Tech Incorporated ...*Pasadena, California*, 13.0015.  
 Tetra Tech Incorporated ...*Arlington, Virginia*, 12.0041.  
 Texas A & M University System ...*College Station, Texas*, 6.0151, 6.0379, 8.0128, 10.0001, 15.0035, 15.0036, 16.0024.  
 Texas A & M University System ...*Prairie View, Texas*, 3.0274.  
 Texas Technological University ...*Lubbock, Texas*, 5.0022, 6.0387, 12.0002, 12.0040.  
 Texoma Regional Planning Comm. ...*Denison, Texas*, 6.0381.  
 Transportation Res. Board ...*Washington, District of Columbia*, 9.0010.  
 Tri Cities Seismic Safe. Study ...*Richmond, California*, 3.0149, 16.0058.  
 Tuscaloosa Area Coun. of Gov. ...*Tuscaloosa, Alabama*, 6.0159, 6.0160.  
 U R S Systems Corporation ...*San Mateo, California*, 8.0056, 16.0027.  
 U.S. Air Force ...*Washington, District of Columbia*, 8.0071, 12.0003.  
 U.S. Air Force ...*Belleville, Illinois*, 6.0081, 8.0029, 12.0016, 12.0029.  
 U.S. Air Force ...*Dayton, Ohio*, 5.0030.  
 U.S. Army ...*Mobile, Alabama*, 6.0033.  
 U.S. Army ...*Davis, California*, 6.0037, 6.0038, 6.0167.  
 U.S. Army ...*Los Angeles, California*, 3.0005, 6.0172.  
 U.S. Army ...*Washington, District of Columbia*, 3.0187, 6.0053, 6.0054, 8.0019, 8.0072, 8.0073, 13.0019, 15.0004, 15.0015.  
 U.S. Army ...*Jacksonville, Florida*, 8.0025, 15.0006.  
 U.S. Army ...*Savannah, Georgia*, 8.0028, 15.0007.  
 U.S. Army ...*Honolulu, Hawaii*, 6.0247.  
 U.S. Army ...*Urbana, Illinois*, 3.0203.  
 U.S. Army ...*Chicago, Illinois*, 15.0019.  
 U.S. Army ...*Fort Knox, Kentucky*, 16.0007.  
 U.S. Army ...*New Orleans, Louisiana*, 6.0095, 6.0096, 6.0097, 6.0098, 6.0099, 6.0100, 8.0030, 8.0031, 8.0032, 8.0033, 15.0021.  
 U.S. Army ...*Aberdeen Proving Ground, Maryland*, 16.0008.  
 U.S. Army ...*Edgewood Arsenal, Maryland*, 3.0217.  
 U.S. Army ...*Waltham, Massachusetts*, 6.0108, 6.0109, 6.0110, 6.0111, 8.0034, 8.0035, 8.0036, 8.0037.  
 U.S. Army ...*Vicksburg, Mississippi*, 3.0065, 3.0066, 3.0067, 3.0232, 3.0233, 3.0234, 4.0002, 4.0003, 6.0116, 6.0117, 6.0118, 6.0119, 6.0120, 6.0121, 6.0312, 6.0313, 6.0314, 8.0013, 8.0014, 8.0038, 8.0039, 8.0040, 8.0041, 8.0042, 8.0043, 8.0044, 8.0045, 8.0046, 8.0047, 8.0048, 8.0119, 10.0009, 10.0010, 10.0030, 13.0009, 13.0010, 13.0026, 13.0027, 13.0028.  
 U.S. Army ...*Kansas City, Missouri*, 6.0315.  
 U.S. Army ...*St. Louis, Missouri*, 3.0242, 6.0320.  
 U.S. Army ...*Omaha, Nebraska*, 9.0054.  
 U.S. Army ...*Watervliet, New York*, 15.0009.  
 U.S. Army ...*Tulsa, Oklahoma*, 6.0141, 6.0142.  
 U.S. Army ...*Portland, Oregon*, 3.0267.  
 U.S. Army ...*Carlisle, Pennsylvania*, 16.0101.  
 U.S. Army ...*Philadelphia, Pennsylvania*, 15.0010.  
 U.S. Army ...*Pittsburgh, Pennsylvania*, 6.0358.  
 U.S. Army ...*Galveston, Texas*, 6.0152.  
 U.S. Army ...*Norfolk, Virginia*, 8.0050, 15.0011.  
 U.S. Army ...*Huntington, West Virginia*, 6.0405.  
 U.S. Atomic Energy Commission ...*Los Alamos, New Mexico*, 12.0019.  
 U.S. Coastal Bend Reg. Comm. ...*Corpus Christi, Texas*, 6.0380, 8.0015.

U.S. Dept. of Agriculture ...*Riverside, California*, 5.0006, 5.0007, 5.0040, 6.0041, 15.0002.  
 U.S. Dept. of Agriculture ...*Fort Collins, Colorado*, 1.0012.  
 U.S. Dept. of Agriculture ...*Washington, District of Columbia*, 5.0010, 6.0055, 6.0194, 6.0195, 6.0196, 6.0197, 6.0198, 6.0199, 6.0200, 6.0201, 6.0202, 6.0203, 6.0204, 6.0205, 6.0206, 7.0001, 7.0002, 7.0007.  
 U.S. Dept. of Agriculture ...*Macon, Georgia*, 5.0011, 5.0042, 5.0043.  
 U.S. Dept. of Agriculture ...*St. Paul, Minnesota*, 5.0015, 5.0016, 5.0045.  
 U.S. Dept. of Agriculture ...*Missoula, Montana*, 5.0018, 5.0019, 5.0020, 5.0028, 5.0046.  
 U.S. Dept. of Agriculture ...*Portland, Oregon*, 9.0062, 15.0034.  
 U.S. Dept. of Agriculture ...*Riesel, Texas*, 6.0388.  
 U.S. Dept. of Commerce ...*San Francisco, California*, 3.0155, 3.0156.  
 U.S. Dept. of Commerce ...*Boulder, Colorado*, 2.0010, 3.0019, 3.0049, 3.0159, 3.0160, 3.0161, 3.0162, 7.0012, 8.0057, 8.0058, 8.0059, 8.0060, 8.0061, 8.0062, 8.0063, 8.0064, 8.0065, 11.0003, 12.0023, 12.0024, 12.0025, 12.0026, 12.0027, 13.0004, 13.0005.  
 U.S. Dept. of Commerce ...*Washington, District of Columbia*, 3.0055, 3.0188, 3.0189, 3.0190, 3.0191, 3.0192, 3.0193, 3.0194, 3.0195, 6.0001, 6.0056, 6.0057, 6.0207, 8.0004, 8.0020, 8.0021, 8.0022, 8.0023, 8.0074, 8.0075, 8.0076, 8.0077, 8.0078, 12.0001, 12.0004, 12.0005, 12.0012, 12.0013, 12.0014, 12.0015, 16.0030, 16.0042, 16.0043, 16.0067, 16.0068, 16.0069, 16.0070, 16.0071, 16.0072, 16.0073.  
 U.S. Dept. of Commerce ...*Miami, Florida*, 2.0003, 8.0005, 8.0084, 8.0085, 8.0086, 8.0087, 8.0088, 8.0089, 8.0090, 8.0091, 8.0092, 8.0093, 8.0094, 8.0095.  
 U.S. Dept. of Commerce ...*Honolulu, Hawaii*, 8.0097, 13.0020.  
 U.S. Dept. of Commerce ...*Rockville, Maryland*, 2.0005, 3.0002, 3.0024, 3.0025, 3.0218, 3.0219, 3.0220, 3.0221, 3.0222, 3.0223, 3.0224, 8.0106, 8.0107, 11.0004, 13.0007, 13.0008, 13.0025, 16.0090.  
 U.S. Dept. of Commerce ...*Silver Spring, Maryland*, 6.0005, 6.0006, 6.0103, 6.0104, 6.0289, 6.0290, 8.0108, 8.0109, 8.0110, 8.0111, 8.0112, 8.0113, 8.0114, 8.0115, 8.0116, 16.0046, 16.0091, 16.0092.  
 U.S. Dept. of Commerce ...*Kansas City, Missouri*, 11.0005, 12.0036, 12.0037.  
 U.S. Dept. of Commerce ...*Las Vegas, Nevada*, 3.0245, 3.0246.  
 U.S. Dept. of Commerce ...*Atlantic City, New Jersey*, 5.0029.  
 U.S. Dept. of Commerce ...*Garden City, New York*, 6.0021, 6.0022, 11.0009, 12.0020.  
 U.S. Dept. of Commerce ...*Asheville, North Carolina*, 8.0122, 8.0123.  
 U.S. Dept. of Commerce ...*Norman, Oklahoma*, 12.0007, 12.0008, 12.0021, 12.0022, 12.0038, 12.0039.  
 U.S. Dept. of Commerce ...*Columbia, South Carolina*, 5.0031, 8.0127.  
 U.S. Dept. of Commerce ...*Nashville, Tennessee*, 2.0024, 12.0009.  
 U.S. Dept. of Commerce ...*Fort Worth, Texas*, 8.0016, 8.0129, 8.0130, 8.0131, 8.0132.  
 U.S. Dept. of Commerce ...*Salt Lake City, Utah*, 6.0391, 7.0016, 11.0006, 12.0010.  
 U.S. Dept. of Defense ...*Alexandria, Virginia*, 16.0106.  
 U.S. Dept. of Hlth. Ed. & Wel. ...*Rockville, Maryland*, 16.0011.  
 U.S. Dept. of Hou. & Urb. Dev. ...*Washington, District of Columbia*, 3.0021, 3.0196, 8.0079.  
 U.S. Dept. of Hou. & Urb. Dev. ...*Scranton, Pennsylvania*, 16.0011.

3.0039, 3.0105, 3.0106, 3.0107, 3.0108, 3.0109, 3.0110,  
 3.0111, 3.0112, 3.0113, 3.0114, 3.0115, 3.0116, 3.0117,  
 3.0118, 3.0119, 3.0120, 3.0121, 3.0122, 3.0123, 3.0124,  
 3.0125, 3.0126, 3.0127, 3.0128, 3.0129, 3.0130, 3.0131,  
 3.0132, 3.0133, 3.0134, 3.0135, 6.0176, 9.0001, 9.0002,  
 9.0027, 9.0028, 9.0029, 9.0030, 9.0031, 9.0032, 9.0033,  
 9.0034, 10.0015, 10.0016, 13.0013, 13.0014, 14.0002,  
 14.0006, 15.0013, 16.0054, 16.0055, 16.0056.  
 U.S. Dept. of the Interior ...*Sacramento, California*, 6.0180,  
 10.0017, 10.0018, 10.0019.  
 U.S. Dept. of the Interior ...*Boulder, Colorado*, 3.0020, 3.0050,  
 3.0051, 3.0163, 3.0164, 3.0165, 3.0166, 3.0167, 3.0168.  
 U.S. Dept. of the Interior ...*Denver, Colorado*, 1.0009, 1.0010,  
 3.0052, 3.0053, 3.0169, 3.0170, 3.0171, 3.0172, 3.0173,  
 3.0174, 3.0175, 3.0176, 3.0177, 3.0178, 3.0179, 3.0180,  
 3.0181, 3.0182, 3.0183, 3.0184, 3.0185, 4.0004, 4.0005,  
 4.0006, 4.0007, 6.0048, 6.0049, 6.0183, 6.0184, 6.0185,  
 6.0186, 6.0187, 6.0188, 9.0008, 9.0009, 9.0040, 9.0041,  
 9.0042, 9.0043, 9.0044, 9.0045, 9.0046, 9.0047, 9.0048,  
 10.0004, 10.0005, 10.0006, 10.0020, 10.0021, 10.0022,  
 10.0023, 10.0024, 13.0017, 13.0018, 14.0007, 14.0008,  
 14.0009, 14.0010, 14.0011, 14.0012, 14.0013.  
 U.S. Dept. of the Interior ...*Hartford, Connecticut*, 6.0193.  
 U.S. Dept. of the Interior ...*Washington, District of Columbia*,  
 3.0056, 3.0197, 3.0198, 6.0058, 6.0059, 6.0060, 6.0061,  
 6.0062, 6.0063, 6.0064, 6.0065, 6.0208, 6.0209, 6.0210,  
 6.0211, 6.0212, 6.0213, 6.0214, 6.0215, 6.0216, 6.0217,  
 6.0218, 6.0219, 6.0220, 6.0221, 6.0222, 9.0049, 10.0027,  
 13.0006, 14.0001, 14.0014, 16.0044, 16.0074, 16.0075.  
 U.S. Dept. of the Interior ...*Miami, Florida*, 6.0067, 6.0068,  
 6.0069.  
 U.S. Dept. of the Interior ...*Ocala, Florida*, 6.0230.  
 U.S. Dept. of the Interior ...*Tallahassee, Florida*, 6.0233.  
 U.S. Dept. of the Interior ...*Tampa, Florida*, 6.0071, 6.0234,  
 8.0027, 10.0029.  
 U.S. Dept. of the Interior ...*Atlanta, Georgia*, 6.0075, 6.0244.  
 U.S. Dept. of the Interior ...*Honolulu, Hawaii*, 3.0057, 6.0248,  
 6.0249, 6.0250, 6.0251, 14.0004.  
 U.S. Dept. of the Interior ...*Boise, Idaho*, 6.0079, 6.0254.  
 U.S. Dept. of the Interior ...*Champaign, Illinois*, 6.0082, 6.0255,  
 6.0256.  
 U.S. Dept. of the Interior ...*Oak Park, Illinois*, 6.0261.  
 U.S. Dept. of the Interior ...*Iowa City, Iowa*, 6.0274, 6.0275,  
 6.0276, 6.0277, 6.0278, 6.0279, 6.0280.  
 U.S. Dept. of the Interior ...*Lawrence, Kansas*, 6.0090, 6.0091,  
 6.0281, 6.0282.  
 U.S. Dept. of the Interior ...*Louisville, Kentucky*, 6.0093.  
 U.S. Dept. of the Interior ...*Baton Rouge, Louisiana*, 6.0094.  
 U.S. Dept. of the Interior ...*College Park, Maryland*, 6.0102.  
 U.S. Dept. of the Interior ...*Boston, Massachusetts*, 6.0106,  
 6.0296, 6.0297, 15.0023.  
 U.S. Dept. of the Interior ...*St. Paul, Minnesota*, 6.0303,  
 6.0304, 6.0305.  
 U.S. Dept. of the Interior ...*Jackson, Mississippi*, 6.0114,  
 6.0115, 6.0310, 6.0311.  
 U.S. Dept. of the Interior ...*Rolla, Missouri*, 6.0316, 6.0317,  
 6.0318, 6.0319.  
 U.S. Dept. of the Interior ...*St. Louis, Missouri*, 3.0243.  
 U.S. Dept. of the Interior ...*Las Vegas, Nevada*, 3.0247.  
 U.S. Dept. of the Interior ...*Trenton, New Jersey*, 2.0018,  
 6.0325, 6.0326.  
 U.S. Dept. of the Interior ...*Albuquerque, New Mexico*, 6.0020,  
 6.0327, 13.0011.  
 U.S. Dept. of the Interior ...*Santa Fe, New Mexico*, 6.0129.  
 U.S. Dept. of the Interior ...*Albany, New York*, 6.0331.  
 6.0344.  
 U.S. Dept. of the Interior ...*Columbus, Ohio*, 6.0349.  
 U.S. Dept. of the Interior ...*Oklahoma City, Oklahoma*,  
 6.0140.  
 U.S. Dept. of the Interior ...*Harrisburg, Pennsylvania*,  
 6.0357.  
 U.S. Dept. of the Interior ...*Columbia, South Carolina*,  
 6.0365.  
 U.S. Dept. of the Interior ...*Huron, South Dakota*, 6.  
 U.S. Dept. of the Interior ...*Nashville, Tennessee*,  
 6.0370, 6.0371.  
 U.S. Dept. of the Interior ...*Austin, Texas*, 6.0  
 6.0373, 6.0374, 6.0375, 6.0376, 6.0377, 10.001  
 10.0013.  
 U.S. Dept. of the Interior ...*Corpus Christi, Texas*, 15  
 U.S. Dept. of the Interior ...*Fort Worth, Texas*, 6.03  
 6.0384.  
 U.S. Dept. of the Interior ...*Houston, Texas*, 6.0386.  
 U.S. Dept. of the Interior ...*San Antonio, Texas*, 6.03  
 U.S. Dept. of the Interior ...*Salt Lake City, Utah*, 6.0  
 U.S. Dept. of the Interior ...*Arlington, Virginia*, 6.01  
 6.0395, 8.0133, 15.0039.  
 U.S. Dept. of the Interior ...*Fairfax, Virginia*, 6.0400.  
 U.S. Dept. of the Interior ...*Richmond, Virginia*, 6.04  
 U.S. Dept. of the Interior ...*Tacoma, Washington*,  
 6.0404.  
 U.S. Dept. of the Interior ...*Madison, Wisconsin*,  
 6.0408, 6.0409.  
 U.S. Dept. of the Interior ...*Cheyenne, Wyoming*,  
 6.0415.  
 U.S. Dept. of Transportation ...*Washington, District of Columbia*, 3.0199, 16.0031.  
 U.S. Dept. of Transportation ...*Cambridge, Massachusetts*,  
 16.0032.  
 U.S. Exec. Office of the Pres. ...*Washington, District of Columbia*, 3.0200, 6.0002, 8.0001, 16.0005, 16.0076, 16.  
 U.S. Natl. Aero. & Space Adm. ...*Moffett Field, California*,  
 9.0035.  
 U.S. Natl. Aero. & Space Adm. ...*Washington, District of Columbia*, 9.0050.  
 U.S. Natl. Aero. & Space Adm. ...*Cocoa Beach, Florida*,  
 U.S. Natl. Aero. & Space Adm. ...*Greenbelt, Maryland*,  
 16.0009.  
 U.S. Natl. Aero. & Space Adm. ...*Cleveland, Ohio*,  
 16.0048.  
 U.S. Natl. Science Foundation ...*Washington, District of Columbia*, 7.0014.  
 U.S. Navy ...*Monterey, California*, 8.0052, 8.0053.  
 U.S. Navy ...*Port Hueneme, California*, 3.0007.  
 U.S. Navy ...*Washington, District of Columbia*, 8.00  
 8.0082.  
 U.S. Navy ...*Patuxent River, Maryland*, 16.0010.  
 U.S. Navy ...*Silver Spring, Maryland*, 5.0012.  
 U.S. Navy ...*Norfolk, Virginia*, 8.0136.  
 U.S. Tennessee Valley Auth. ...*Knoxville, Tennessee*,  
 6.0368.  
 U.S. Veterans Administration ...*Washington, District of Columbia*, 3.0201.  
 U.S. Water Resources Council ...*Washington, District of Columbia*, 6.0223, 6.0224, 6.0225, 6.0226, 6.0227, 6.02  
 Union County Planning Board ...*Eliabeth, New Jersey*,  
 Univ. of Alabama ...*University, Alabama*, 6.0162.  
 Univ. of Alaska ...*College, Alaska*, 3.0070, 3.0071, 1  
 Univ. of Alaska ...*Fairbanks, Alaska*, 3.0072, 6.0163.  
 Univ. of Arizona ...*Tucson, Arizona*, 6.0036.

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ARIZONA STATE UNIVERSITY  
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*M.C. HOYER*

COLORADO STATE UNIVERSITY  
U.S.D.A. ROCKY MTN. FOR. STA.

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AVALANCHE HAZARD PREDICTION IN ALPINE  
AREAS OF THE ROCKY MOUNTAINS,  
*M. MARTINELLI*

MONTANA STATE UNIVERSITY  
GRADUATE SCHOOL

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TIES OF SNOW APPLIED TO THE DETERMINATION OF  
SLAB AVALANCHE INITIATION,  
*C.C. BRADLEY*

MONTANA STATE UNIVERSITY  
SCHOOL OF LETTERS

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TIES OF SNOW APPLIED TO THE DETERMINATION OF  
SLAB AVALANCHE INITIATION 11042-EN,  
*C.C. BRADLEY*

.0013 SNOW PACK STABILITY INDICES RELATIVE TO  
THE CLIMAX AVALANCHE,  
*C.C. BRADLEY*

STATE DEPT. OF HIGHWAYS

.0001 AVALANCHE STUDIES, 1971-1972,  
*E.R. LACHAPELLE*

.0006 AVALANCHES ON THE NORTH CASCADES  
HIGHWAY (SR-20) - SUMMARY REPORT,  
*E.R. LACHAPELLE*

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STUDY,  
*E. LACHAPELLE*

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ROCKY MTN. FOR. & RG. EX. STA.

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RELATED TO WEATHER AND AVALANCHE CONDI-  
TIONS,  
*M. MARTINELLI*

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GEOLOGICAL SURVEY

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TY URBAN AREA, ALASKA,  
*R.D. MILLER*

UNIV. OF COLORADO  
INST. OF ARCTIC & ALPINE RES.

1.0008 DEVELOPMENT OF METHODOLOGY FOR  
EVALUATION AND PREDICTION OF AVALANCHE  
HAZARD IN THE SAN JUAN MOUNTAINS OF  
COLORADO,  
*J.D. IVES*

UNIV. OF WASHINGTON  
SCHOOL OF ARTS

1.0002 NORTH CASCADES HIGHWAY SR-20  
AVALANCHE ATLAS,  
*E.R. LACHAPELLE*

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ATMOSPHERICS INCORPORATED

2.0008 PROJECT ARID DROP, A SUMMARY REPORT OF  
CLOUD SEEDING ACTIVITIES IN ARIZONA AS CON-  
DUCTED BY ATMOSPHERICS INCORPORATED (AB-  
BREV),  
*T.J. HENDERSON*

FLIGHT TEST RESEARCH INC.

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VOLUME I,  
*P.B. MACCREADY*

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BLE, FLORIDA, DURING EXTREME DROUGHT,  
*R.J. RUSSELL*

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MISSISSIPPI,  
*J.C. MCWHORTER*

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DAKOTA,  
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GENCY WATER SUPPLY FOR NEW YORK CITY,  
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LATION,  
*G. ARON*

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THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV),  
*J.T. ALFORE*

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*F.A. HUFF*  
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IN MODERATE TO SEVERE DROUGHTS,  
*F.A. HUFF*

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FOR DROUGHT MITIGATION, APRIL-MAY 1971,  
*W.L. WOODLEY*

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*J.J.*

### U.S. DEPT. OF COMMERCE RESEARCH FLIGHT FACILITY

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*J.*

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DROUGHT FLOWS OF VARYING DEGRE-  
TY AND DURATION - NEW JERSEY,

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AND SEVERE WEATHER,  
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PAST CHRONOLOGICAL AND SPATIAL  
IMPLICATIONS FOR THE FUTURE,

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- 2.0017 ECONOMIC EVALUATION OF  
DEVELOPMENT OF WATER AND LAND

### UNIV. OF NORTH CAROLINA SCHOOL OF ARTS

- 2.0019 EROSION AND DEPOSITION IN  
AND ESTUARIES OF THE NORTH CARO

### UNIV. OF PITTSBURGH GRADUATE SCHOOL

- 2.0021 ALTERNATIVE ADJUSTMENTS  
HAZARDS,

### UNIV. OF PUERTO RICO

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W.L. PARKS

### WEATHER SCIENCES INCORPORATED

2.0006 OKLAHOMA DROUGHT RELIEF OPERATIONAL  
PROGRAM (ODROP),  
J.L. SUTHERLAND

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### BATTELLE MEMORIAL INSTITUTE

3.0265 SURVEY REPORT ON STRUCTURAL DESIGN OF  
PIPING SYSTEMS AND COMPONENTS,  
E.C. RODABAUGH

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UNKNOWN

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FERENCE 2-3 APRIL 1973,  
J.C. FULTON

### CALIF. INST. OF TECHNOLOGY EARTHQUAKE ENGIN. RES. LAB.

3.0041 EARTHQUAKE RESPONSE OF BUILDING-FOUN-  
DATION SYSTEMS,  
J. BIELAK

3.0043 DYNAMICS OF BUILDING - SOIL INTERACTION,  
P.C. JENNINGS

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WALLS AND SANDWICH BEAMS,  
K.S. SKATTUM

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RESPONSE OF TALL BUILDINGS,  
J.B. HOERNER

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FRAME BUILDING,  
P.C. JENNINGS

3.0148 ANALYSIS OF THE EARTHQUAKE RESPONSE OF  
A NINE-STORY STEEL FRAME BUILDING DURING  
THE SAN FERNANDO EARTHQUAKE,  
J.H. WOOD

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TO SELECTED U.S. NAVY INSTALLATIONS,  
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NANDO EARTHQUAKE STUDIES

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3.0042 NATIONAL INFORMATION SERVICE FOR  
EARTHQUAKE ENGINEERING, SAN FERNANDO DATA  
PROCESSING,  
D.E. HUDSON

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RISK DUE TO RESERVOIR FILLING,  
G.W. HOUSNER

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MOTION USING AN ARRAY OF ACCELEROGRAPHS -  
CALIFORNIA,  
M.D. TRIFUNAC

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SAN FERNANDO EARTHQUAKE,  
P. JUNGELS

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AND THE MANTLE STRUCTURE BENEATH  
THE NORTHWESTERN UNITED STATES,  
D. MCKENZIE

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NEVADA SEISMIC ZONE,  
F.J. GUMPER

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DENALI, FAIRWEATHER, AND CASTLE MOUNTAIN  
FAULTS, ALASKA,  
R. PAGE

3.0260 EXPERIMENTAL AND THEORETICAL STUDY OF  
THE DILATANCY-DIFFUSION MODEL FOR  
EARTHQUAKE PREDICTION,  
C.H. SCHOLZ

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STUDY OF SEISMICITY GAPS AND INTRAPLATE  
EARTHQUAKES,  
L.R. SYKES

3.0262 A COMPREHENSIVE STUDY OF THE  
SEISMOTECTONICS OF THE ALEUTIAN ARC -  
ALASKA,  
L.R. SYKES

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SEISMIC METHODS,  
M. WYSS

## CORNELL UNIVERSITY SCHOOL OF ARCHITECTURE

3.0257 LARGE SCALE INTEGRATION IN URBAN  
PLANNING WITH APPLICATIONS TO TALL BUILDING  
PLANNING IN REGIONS SUBJECTED TO NATURAL  
HAZARDS,  
B.G. JONES

## EARTHQUAKES

GEORGIA INST. OF TECHNOLOGY  
SCHOOL OF GEOSCIENCESEARTHQUAKE TASK FORCES  
EARTHQUAKE (ABBREV.)

- 3.0202 A STUDY OF MICROEARTHQUAKES IN THE  
SOUTHEASTERN UNITED STATES,  
L.T. LONG

MASS. INST. OF TECH.  
SCHOOL OF ENGINEERING

## U T RESEARCH INSTITUTE

- 3.0204 TECHNIQUES FOR RETROFITTING EXISTING  
BRIDGE STRUCTURES TO REDUCE THE SUSCEPTI-  
BILITY TO EARTHQUAKE DAMAGE,  
ROBINSON

3.0026 DAMAGE STATISTICS  
BUILDINGS IN THE VICINITY OF  
EARTHQUAKE.

## JOHN A. BLUME &amp; ASSOCIATES

- 3.0013 INVESTIGATION OF GROUND MOTION  
DAMAGE RELATIONSHIPS FOR RESIDENTIAL  
BUILDINGS IN GLENDALE, CALIFORNIA SAN FER-  
NANDO EARTHQUAKE, FEBRUARY 9,  
L. FARRHOOLAND

3.0061 THE FORMULATION AND  
VERIFICATION OF MATHEMATICAL  
PREDICTING DYNAMIC RE-  
SPONSE BUILDINGS.

- 3.0014 RESPONSE OF TWO IDENTICAL SEVEN-STORY  
STRUCTURES TO THE SAN FERNANDO EARTHQUAKE  
OF FEBRUARY 9, 1971,  
S.A. FREEMAN

3.0062 SENSITIVITY ANALYSIS  
METHOD FOR PRELIMINARY SOIL

- 3.0015 OBSERVATIONS OF DAMAGE TO GLENDALE  
SWIMMING POOLS, MOBILE HOMES, AND COMMER-  
CIAL BUILDINGS RESULTING FROM SAN FERNANDO  
EARTHQUAKE OF 1971,  
B.H. NELSON

3.0063 DAMAGE PROBABILITY ME-  
TYPE BUILDINGS.

- 3.0016 SEISMIC MOTION-DAMAGE RELATIONSHIPS  
FOR LOW RISE BUILDINGS - COLORADO,  
R.F. SCHOLT

3.0064 SUMMARY OF METHODOLO-  
PLICATION.

- 3.0017 DAMAGE SURVEY, SAN FERNANDO  
EARTHQUAKE OF FEBRUARY 9, 1971,  
UNKNOWN

3.0227 INELASTIC DESIGN OF BR-  
RESIST EARTHQUAKES

- 3.0018 STRUCTURAL EFFECTS OF THE FAIRBANKS,  
ALASKA EARTHQUAKE OF JUNE 21, 1967,  
UNKNOWN

3.0228 NONLINEAR AND COMPLET

- 3.0048 COMPARISONS OF SEISMIC ANALYSES OF TWO  
IDENTICAL STRUCTURES BASED ON SEISMOGRAMS  
FROM THE SAN FERNANDO EARTHQUAKE (AB-  
BREV),  
S.A. FREEMAN

3.0229 SEISMIC DESIGN OF CON-  
EASTERN METROPOLITAN AREA

- 3.0154 ELEMENTS OF DYNAMIC INELASTIC DESIGN  
CODE,  
J.A. BLUME

3.0230 METHODOLOGY AND PRACTICE

## JOHN H. WIGGINS COMPANY

- 3.0008 COST-BENEFIT RISK ANALYSIS OF RESEARCH  
BUDGETING FOR EARTHQUAKE HAZARD MITIGA-  
TION,  
J.H. WIGGINS

MASS. INST. OF TECH.  
SCHOOL OF ENGINEERING

- 3.0009 BUDGETING JUSTIFICATION FOR EARTHQUAKE  
ENGINEERING RESEARCH,  
J.H. WIGGINS

3.0226 SEISMIC GROUND EFFECTS  
NEW THEORIES OF TECTONIC  
MECHANISM.

## LOS ANGELES CO. BD. OF SUPVRS.

- 3.0004 REPORTS OF THE EARTHQUAKE TASK FORCES

MISSISSIPPI ARK. TENN.  
3.0069 REGIONAL EARTHQUAKE  
TECHNICAL REPORT3.0269 EARTHQUAKE RISK EVALUATION  
DEN COUNTY, ARKANSAS, MISSISSIPPI AND SHREVEPORT COUNTY, TENN.3.0270 REGIONAL EARTHQUAKE  
SOUTH ARKANSAS, KENTUCKY,  
MISSISSIPPI AREA.

## NATL. RES. COUNCIL

4 EARTHQUAKES RELATED TO RESERVOIR  
LING,

UNKNOWN

## OAK RIDGE NATIONAL LABORATORY

1 DYNOR - DYNAMIC ANALYSIS OF STRUC-  
RAL SYSTEMS,

R.M. HOLMES

2 EARTHQUAKES INDUCED BY UNDERGROUND  
IID INJECTION,

W.C. MCCLAIN

OHIO UNIVERSITY  
SCHOOL OF ARTS

AGE, GEOMETRY, AND STRESS FIELDS OF  
R MAJOR FAULTS OF THE CALIFORNIA TRANS-  
SE RANGES BY EVALUATION OF WELL DATA,

R.S. YEATS

PENN. STATE UNIVERSITY  
SCHOOL OF EARTH SCIENCES

SEISMIC HAZARD REGIONALIZATION AND  
BABILITY OF FUTURE EARTHQUAKES IN THE  
ED STATES,

B.F. HOWELL

PRINCETON UNIVERSITY  
SCHOOL OF ENGINEERING

STABILITY AND DYNAMIC RESPONSE OF  
LING TOWERS,

D.P. BILLINGTON

## PUBLIC ADMINISTRATION SERVICE

REPORT INTO SELECTED AREAS OF ECONOMIC  
CT OF THE CALIFORNIA EARTHQUAKE FOR  
OFFICE OF EMERGENCY PREPAREDNESS (AB-  
/),

J.V. COYNE

PURDUE UNIVERSITY  
SCHOOL OF AERONAUTICS

RESPONSE OF POWER SYSTEMS TO THE SAN  
ANDO VALLEY EARTHQUAKE OF 9 FEBRUARY

A.J. SCHIFF

PURDUE UNIVERSITY  
SCHOOL OF CIVIL ENGIN.

PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC  
CTURES,

T.L. PAEZ

ST. LOUIS UNIVERSITY  
GRADUATE SCHOOL

3.0235 SOME GROUND MOTION AND INTENSITY  
RELATIONS FOR THE CENTRAL UNITED STATES,

A. NECIOGLU

3.0236 A MICROEARTHQUAKE STUDY OF THE LOWER  
MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND  
TENNESSEE,

O.W. NUTTLI

3.0237 MAGNITUDE RECURRENCE RELATION FOR  
CENTRAL MISSISSIPPI VALLEY EARTHQUAKES,

O.W. NUTTLI

3.0238 THE RELATION BETWEEN FELT AREA AND  
MAGNITUDE FOR CENTRAL UNITED STATES  
EARTHQUAKES,

O.W. NUTTLI

ST. LOUIS UNIVERSITY  
SCHOOL OF ARTS

3.0240 RESEARCH IN EARTH STRAINS AND FOCAL  
MECHANISMS - MISSOURI,

W. STAUDER

ST. LOUIS UNIVERSITY  
SCHOOL OF ENGINEERING

3.0239 TRAVEL-TIME TABLES FOR EARTHQUAKES IN  
THE CENTRAL UNITED STATES,

O.W. NUTTLI

3.0241 SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS  
EARTHQUAKE OF NOVEMBER 9, 1968,

W. STAUDER

STANFORD UNIVERSITY  
SCHOOL OF EARTH SCIENCES

3.0138 STUDY OF MECHANISM OF ACCUMULATION  
AND RELEASE OF TECTONIC STRESS IN CENTRAL  
CALIFORNIA,

A. NUR

STANFORD UNIVERSITY  
SCHOOL OF ENGINEERING

3.0040 MEASUREMENTS OF DYNAMIC CHARAC-  
TERISTICS OF MULTISTORY BUILDINGS IN CALIFOR-  
NIA,

H.C. SHAH

3.0136 APPLICATION OF DECISION THEORY IN STRUC-  
TURAL DESIGN FOR RESISTANCE TO LOADINGS  
GENERATED BY EARTHQUAKE PHENOMENA,

J.R. BENJAMIN

3.0137 APPLICATION OF PROBABILITY, STATISTICS  
AND DECISION THEORY IN SOIL ENGINEERING,

K. HOEG



STATE DEPT. OF WATER RESOURCES  
**3.0046** MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SWITCHYARD EQUIPMENT.  
*A.E. FASKEE*

U.S. ARMY  
**3.0187** SEISMIC DESIGN FOR BUILDINGS  
**3.0217** DENVER EARTHQUAKES

STATE DIV. OF HIGHWAYS  
**3.0010** EARTHQUAKE - INDUCED EMBANKMENT DISTRESS,  
*R.A. FORSYTH*

U.S. ARMY  
 CONSTRUCTION ENGINEERING  
**3.0203** EARTHQUAKE EFFECTS ON

STATE DIV. OF MINES & GEOLOGY  
**3.0011** URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).  
*UNKNOWN*  
**3.0047** URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).  
*J.F. AFFORI*

U.S. ARMY  
 ENGINEER DISTRICT  
**3.0005** BEHAVIOR OF UNDERGROUND IN THE SAN FERNANDO EARTHQUAKE FEBRUARY 1971.  
**3.0242** MIRAMIC PARK LAKE - COLUMBIA RIVER BASIN, MIRAMIC RIVER AREA

STATE LEGISLATURE  
**3.0150** MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATEWIDE CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY,  
*K.J. SHENBROGG*  
**3.0151** THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY,  
*UNKNOWN*

**3.0267** FOST CREEK LAKE PROJECT - OREGON,  
 U.S. ARMY  
 WATERWAYS EXPERIMENTAL  
**3.0065** STRUCTURAL MODEL TESTS - EFFECTS (US 015)

STATE MATERIALS & RES. DEPT.  
**3.0012** THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE,  
*R.H. PRYNOCK*  
**3.0152** ELASTOMERIC ENERGY ABSORBER,  
*E.F. NORDIN*

**3.0066** EARTHQUAKE RESISTANCE OF ROCKILL DAMS,  
**3.0067** STUDY OF GROUND MOTION DURING LIQUEFACTION AS A MECHANISM OF MILITARY INSTALLATIONS

STONE & WEBSTER ENGIN. CORP.  
**3.0225** SEISMIC RESEARCH,  
*R. MILLER*

**3.0232** VERIFICATION OF EMPIRICAL FORMULAS FOR DETERMINING RIVERBANK STABILITY INVESTIGATIONS - SOILS PHASE

T.Y. LIN & ASSOCIATES  
**3.0158** FHA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH-RISE BUILDINGS,  
*R.W. CLOUGH*

**3.0233** STATE OF THE ART - TO DETERMINE EARTHQUAKE HAZARDS IN THE U.S. PORTLAND CEMENT

TEXAS A & M UNIVERSITY SYSTEM  
 SCHOOL OF ENGINEERING  
**3.0274** THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE,  
*H.Y. YIH*

**3.0234** LIQUEFACTION - SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING  
 U.S. DEPT. OF COMMERCE  
 BUILDING RESEARCH  
**3.0055** ENGINEERING ASPECTS OF

U.S. DEPT. OF COMMERCE  
CENTER FOR BUILDING TECHNOLOGY

3.0191 DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WIND-STORMS,

W.F. REPS

U.S. DEPT. OF COMMERCE  
EARTH SCIENCES LABORATORIES

3.0160 THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT,

S.T. ALGERMISSEN

U.S. DEPT. OF COMMERCE  
EARTH SCIENCES LABORATORY

3.0245 SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972,

K.C. BAYER

3.0246 EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971,

K.C. BAYER

U.S. DEPT. OF COMMERCE  
EARTHQUAKE MECHANISM LAB.

3.0155 MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT,

R.D. NASON

3.0156 ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLLISTER, CALIFORNIA,

T.H. ROGERS

U.S. DEPT. OF COMMERCE  
ENVIRON. RESEARCH LABORATORIES

3.0019 ENGINEERING SEISMOLOGY,

L.R. ALLDREDGE

3.0049 TSUNAMI RESEARCH,

S.T. ALGERMISSEN

3.0159 ENG AFTERSHOCK STUDIES - CALIFORNIA,

S.T. ALGERMISSEN

3.0161 A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS,

UNKNOWN

3.0162 A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA,

UNKNOWN

3.0223 ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972

U.S. DEPT. OF COMMERCE  
NATL. BUREAU OF STANDARDS

3.0188 BUILDING PRACTICES FOR DISASTER MITIGATION,

C.G. CULVER

3.0189 STRENGTH OF EXISTING MASONRY WALLS,

S.G. FATTAL

3.0190 INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION,

S.G. FATTAL

3.0192 BUILDING PRACTICES FOR DISASTER MITIGATION,

R.N. WRIGHT

3.0193 EARTHQUAKE DESIGN FOR MASONRY STRUCTURES,

F.Y. YOKEL

3.0194 DESIGN CRITERIA FOR MASONRY,

F.Y. YOKEL

U.S. DEPT. OF COMMERCE  
NATL. OCEAN SURVEY

3.0002 STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A,

K.V. STEINBRUGGE

3.0024 STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX B,

S.T. ALGERMISSEN

3.0025 THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969,

K.V. STEINBRUGGE

3.0219 SEISMIC RISK STUDIES IN THE UNITED STATES,

S.T. ALGERMISSEN

3.0220 ALEUTIAN SEISMICITY - MILROW SEISMIC EFFECTS,

E.R. ENGDALH

3.0221 THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967,

J.N. JORDAN

3.0222 IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES,

A.C. TARR

U.S. DEPT. OF COMMERCE  
NATL. OCEANIC & ATMOS. ADMIN.

3.0218 RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION,

S.T. ALGERMISSEN

U.S. DEPT. OF HOU. & URB. DEV.  
FED. INSURANCE ADMINISTRATION

U.S. DEPT. OF HOU. & URB. DEV.  
OFF. OF POLICY DEV. & RES.

3.0021 PERFORMANCE OF SINGLE FAMILY DWELLINGS IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971.

F.E. MCCLURE

U.S. DEPT. OF THE INTERIOR  
BUREAU OF RECLAMATION

3.0053 COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM.

L.H. ROEHM

3.0171 EARTH AND ROCKFILL DAM DESIGN PRACTICES.

L.M. CHRISTIANSEN

3.0173 EARTHQUAKES AND ACTIVE FAULTS.

J.S. DODD

3.0183 EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE.

D.A. TIEDEMANN

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

3.0006 VAN NORMAN RESERVOIRS AREA, CALIFORNIA.

R.F. YERKES

3.0020 SEISMIC RISK - FDAA - WASHINGTON AND UTAH.

S.T. ALGERMISSEN

3.0039 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA.

T.W. DIBBLEE

3.0050 TETON DAM SEISMICITY - IDAHO.

W.V. MICKEY

3.0051 NATIONAL EARTHQUAKE INFORMATION SERVICE.

A.C. TARR

3.0052 COAL MINE DEFORMATION STUDIES, SOMERSET, COLORADO.

C.R. DUNRUD

3.0056 HYDRAULIC, GEOLOGIC & SEISMOLOGIC STUDIES.

G. DEBUCHANANNE

3.0057 HAWAIIAN VOLCANO OBSERVATORY.

D.W. PETERSON

3.0100 RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER.

L.C. DUTCHER

3.0105 RELATIVE ACTIVITY OF MULTIPLE FAULT STRANDS - CALIFORNIA.

M.G. BONILLA

3.0106 SANTA CRUZ COUNTY COOP.

E.E. BRABB

3.0107 EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION.

3.0109 ENVIRONMENTAL GEOLOGY OF SAN FRANCISCO BAY REGION - CALIFORNIA.

3.0110 FAULT ZONE TECTONICS (CREEP) - CALIFORNIA.

3.0111 SAN ANDREAS FAULT - CALIFORNIA.

3.0112 SOUTHERN CALIFORNIA TECTONICS.

3.0113 REGIONAL TECTONIC ANALYSIS OF THE SAN ANDREAS FAULT - INVESTIGATION OF THE 1906 MOUNTAIN EARTHQUAKE, APRIL 8, 1906 - CALIFORNIA (ABBREV).

3.0114 EARTHQUAKE MODELING.

3.0115 EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA.

3.0116 MONTEREY BAY - CALIFORNIA.

3.0117 INSTRUMENTAL STRAIN - CALIFORNIA - NEVADA.

3.0118 ENGINEERING SEISMOLOGY - CALIFORNIA.

3.0119 MICROEARTHQUAKE DATA ANALYSIS.

3.0120 MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA.

3.0121 PALO ALTO, SAN MATEO, AND SAN GABRIEL MOUNTAIN 7-1/2-MINUTE QUADRANT - CALIFORNIA, VICINITY.

3.0122 ALASKA GEOLOGIC EARTHQUAKE DATA.

3.0123 RANGELY - CALIFORNIA.

3.0124 REGIONAL AND DETAILED GRAVITY DATA IN TECTONICALLY ACTIVE AREAS - CALIFORNIA.

3.0125 SPECIAL MICROEARTHQUAKE NETWORK - ALABAMA AND TEXAS.

3.0126 STRAIN STUDIES - CALIFORNIA - MONTANA.

3.0127 CRUSTAL STRAIN - CALIFORNIA - MONTANA, UTAH AND NEW MEXICO.

3.0128 EARTHQUAKE HAZARDS AND GEOLOGY OF THE NORTHWEST AND NORTHWESTERN OLYMPIC PENINSULA - WASHINGTON.

3.0129 AUTOMATIC MICROEARTHQUAKE DATA.

3.0131 TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA,

R. VONHUENE

3.0132 ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA,

H.C. WAGNER

3.0133 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA,

R.E. WALLACE

3.0134 CALIFORNIA M/EQ NET,

R.L. WESSON

3.0135 CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA,

R.L. WESSON

3.0163 RISK MAPS AND FIELD INVESTIGATIONS,

S.T. ALGERMISSIN

3.0164 SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES,

W.W. HAYS

3.0165 VA. SEISMICITY - 32 STATES AND PUERTO RICO,

W.V. MICKEY

3.0166 GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO,

W.V. MICKEY

3.0167 SEISMICITY AND EARTH STRUCTURE,

J. TAGGART

3.0168 SOUTH CAROLINA SEISMICITY PROGRAM,

A.C. TARR

3.0169 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO,

G.O. BACHMAN

3.0170 GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA,

J.M. CATTERMOLE

3.0172 GREATER ANCHORAGE AREA BOROUGH, ALASKA,

E. DOBROVOLNY

3.0174 NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE,

M.F. KANE

3.0175 ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA,

R.W. LEMKE

3.0176 DENVER METROPOLITAN AREA, COLORADO,

R.M. LINDVALL

3.0177 V. A. HOSPITAL SITE EVALUATIONS,

T.C. NICHOLS

3.0178 SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO,

S.S. ORIEL

3.0179 EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO,

S.S. ORIEL

3.0180 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE

3.0181 SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO,

D. SCHLEICHER

3.0182 SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO,

B. SKIPP

3.0184 HAMILTON 2 DEGREE,

J.D. WELLS

3.0185 SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO,

P.L. WILLIAMS

3.0197 SEISMIC HAZARDS AND LAND-USE PLANNING,

D.R. NICHOLS

3.0198 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY,

UNKNOWN

3.0243 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN,

P.H. JONES

3.0247 ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973,

UNKNOWN

U.S. DEPT. OF TRANSPORTATION  
NATL. TRANSPORTATION SAFE. BD.

3.0199 PROTECTION OF TRANSPORTATION FACILITIES AGAINST EARTHQUAKES,

UNKNOWN

U.S. EXEC. OFFICE OF THE PRES.  
OFF. OF SCIENCE & TECHNOLOGY

3.0200 REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES,

K.V. STEINBRUGGE

U.S. NAVY  
CIVIL ENGINEERING LAB.

3.0007 PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973,

S.K. TAKAHASHI

U.S. VETERANS ADMINISTRATION  
HOSPITALS CLINICS & REG. OFF.

3.0201 EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES,

UNKNOWN

UNIV. OF ALASKA  
GEOPHYSICAL INSTITUTE

3.0071 EVALUATION OF FEASIBILITY OF MAPPING  
SEISMICALLY ACTIVE FAULTS IN ALASKA,

L. GEDNEY

3.0072 INSTALLATION AND OPERATION OF A  
TELEMETERED SEISMIC NETWORK ON THE ALASKA  
PENINSULA,

UNKNOWN

UNIV. OF CALIFORNIA  
EARTHQUAKE ENGIN. RES. CTR.

3.0003 LITERATURE SURVEY-SEISMIC EFFECTS ON  
HIGHWAY BRIDGES,

T. IWASAKI

3.0029 EARTHQUAKE RESPONSE OF GRAVITY DAMS  
INCLUDING RESERVOIR INTERACTION,

P. CHAKRABARTI

3.0030 EARTHQUAKE ANALYSIS OF MULTISTORY  
BUILDINGS INCLUDING FOUNDATION INTERACTION,

A.K. CHOPRA

3.0031 EARTHQUAKE RESPONSE OF CONCRETE  
GRAVITY DAMS,

A.K. CHOPRA

3.0032 ENERGY ABSORPTION CHARACTERISTICS OF  
STRUCTURAL SYSTEMS SUBJECTED TO  
EARTHQUAKE EXCITATION,

R.W. CLOUGH

3.0033 STOCHASTIC INELASTIC RESPONSE OF  
OFFSHORE TOWERS TO STRONG MOTION  
EARTHQUAKES,

M.K. KAUL

3.0034 EARTHQUAKE RESPONSE OF AXISYMMETRIC  
TOWER STRUCTURES SURROUNDED BY WATER,

C. LIAW

3.0035 SHAKE - A COMPUTER PROGRAM FOR  
EARTHQUAKE RESPONSE ANALYSIS OF HORIZON-  
TALLY LAYERED SITES,

P.B. SCHNABEL

3.0036 EARTHQUAKE ANALYSIS OF STRUCTURE-  
FOUNDATION SYSTEMS,

A.K. VAISH

3.0073 STIFFNESS DEGRADATION OF REINFORCED  
CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEX-  
URAL MOMENTS,

V.V. BERTERO

3.0076 EXPERIMENTAL INVESTIGATION INTO THE  
SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REIN-  
FORCED CONCRETE COMPONENTS AS INFLUENCED  
BY MOMENT AND SHEAR,

M. CELEBI

3.0077 ADAP - A COMPUTER PROGRAM FOR STATIC  
AND DYNAMIC ANALYSIS OF ARCH DAMS,

R.W. CLOUGH

3.0079 GENERAL PURPOSE COMPUTER PROGRAM FOR  
INELASTIC DYNAMIC RESPONSE OF PLANE STRUC-  
TURES,

A.E. KANAAN

3.0081 CONSTITUTIVE MODELS FOR CYCLIC PLASTIC  
DEFORMATION OF ENGINEERING MATERIALS,

J.M. KELLY

3.0083 INFLUENCE OF BASE ROCK CHARACTERISTICS  
ON GROUND RESPONSE,

3.0084 RATE OF LOADING EFFECTS OF  
AND REPAIRED REINFORCED CONCRETE

3.0085 ELASTIC-PLASTIC EARTHQUAKE  
SOIL-BUILDING SYSTEMS,

3.0088 CYCLIC BEHAVIOR OF THREE  
CONCRETE (R.C.) FLEXURAL MEMBERS  
SHEAR,

3.0089 CYCLIC LOADING OF FULL-SCALE  
TIONS,

3.0090 OPTIMUM DESIGN OF EARTHQUAKE  
RESISTANT SHEAR BUILDINGS,

3.0091 DYNAMIC BEHAVIOR OF  
DIAGONALLY BRACED STEEL BUILDINGS,

3.0092 ACCELERATIONS IN ROCK FOUNDATIONS  
IN THE WESTERN UNITED STATES,

3.0093 MODIFICATION OF SEISMOGRAPHIC  
FOR EFFECTS OF LOCAL SOIL CONDITIONS,

3.0095 ANALYSIS OF THE SLIDES IN  
NANDO DAMS DURING THE  
FEBRUARY 9, 1971,

3.0096 SOIL MODULI AND DAMPING  
DYNAMIC RESPONSE ANALYSES,

3.0097 A SIMPLIFIED PROCEDURE FOR  
SOIL LIQUEFACTION POTENTIAL,

3.0098 ANALYTICAL INVESTIGATION  
SEISMIC RESPONSE OF LONG SPAN  
HIGHWAY BRIDGES,

3.0099 STATIC AND EARTHQUAKE  
THREE-DIMENSIONAL FRAME  
WALL BUILDINGS,

UNIV. OF CALIFORNIA  
GRADUATE SCHOOL

3.0153 EARTH STRUCTURE AND FAULTS  
AS RELATED TO EARTHQUAKE  
CALIFORNIA,

UNIV. OF CALIFORNIA  
INST. OF TRANS. & TRAF. ENGINEERING

3.0094 EFFECTS OF SOIL CONDITIONS ON

3.0037 EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES,

K.L. LEE

3.0075 EARTHQUAKE SAFETY OF SCHOOL BUILDINGS,

B. BRESLER

3.0078 NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS,

H.A. FRANKLIN

3.0086 INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES,

PENZIER

3.0087 THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS,

J. PENZIER

3.0102 OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK,

C.M. DUKE

3.0103 SOIL LIQUEFACTION DURING EARTHQUAKES,

K.L. LEE

UNIV. OF CALIFORNIA  
SCHOOL OF LETTERS

3.0028 STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES,

B.A. BOLT

3.0157 AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA,

A. SYLVESTER

UNIV. OF CALIFORNIA  
SEISMOGRAPHIC STATION

3.0080 SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA,

E.G. KEITH

UNIV. OF CALIFORNIA  
SURVEY RESEARCH CENTER

3.0074 THE UNPREDICTABLE DISASTER IN A METROPOLIS - PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971,

L.B. BOURQUE

UNIV. OF ILLINOIS  
GRADUATE SCHOOL

3.0207 SEISMIC BEHAVIOR OF FRAMED TUBES,

J.C. ANDERSON

UNIV. OF ILLINOIS  
SCHOOL OF ENGINEERING

3.0058 QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES

3.0205 STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS,

A.E. AKTAN

3.0206 EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN,

A.E. AKTAN

3.0208 PROBABILISTIC METHODS IN CIVIL ENGINEERING,

A.H. ANG

3.0209 ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES,

J. GHABOUSI

3.0210 RESPONSE AND ENERGY-DISSIPATION OF REINFORCED CONCRETE FRAMES SUBJECTED TO STRONG BASE MOTIONS,

P. GULKAN

3.0211 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS,

M.A. SOZEN

3.0212 EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (AB-BREV),

M.A. SOZEN

3.0213 PROBABILISTIC MODELING OF EXTREME LOADS,

Y.K. WEN

3.0214 SHEAR STRENGTH DECAY IN REINFORCED CONCRETE COLUMNS SUBJECTED TO LARGE DEFLECTION REVERSALS,

J.K. WIGHT

UNIV. OF KENTUCKY  
SCHOOL OF ENGINEERING

3.0060 SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS,

B.O. HARDIN

3.0216 SHEAR MODULUS AND DAMPING IN SOILS - DESIGN EQUATIONS AND CURVES,

B.O. HARDIN

UNIV. OF MICHIGAN  
SCHOOL OF ENGINEERING

3.0231 EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS,

V.L. STREETER

UNIV. OF NEVADA  
SCHOOL OF MINES

3.0248 DILATANCY AND PREMONITORY VARIATIONS OF P, S TRAVEL TIMES,

I.N. GUPTA

3.0249 SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA.

PARTIAL FREQUENCY RESPONSE  
CENTRAL NEVADA.

A. RYALL

3.0275 SEISMICITY AND CONTEMPORARY  
OF THE YELLOWSTONE PARK-H  
GION.

UNIV. OF NEW MEXICO  
BUREAU OF ENGINEERING RESEARCH

3.0027 LOW-CYCLE FATIGUE FAILURE OF SEISMIC  
STRUCTURES.

I. KASIRAJ

3.0251 PROBABILITY OF FATIGUE FAILURE UNDER  
EARTHQUAKE LOADS.

J. TANG

3.0252 A STATISTICAL STUDY OF SOME DESIGN CON-  
CEPTS IN EARTHQUAKE ENGINEERING.

P.H. WIRSCHING

3.0253 ADAPTIVE STRUCTURAL SYSTEMS.

J.T. YAO

3.0255 DYNAMIC BEHAVIOR OF BILINEAR STRUC-  
TURAL SYSTEMS.

H.Y. YEH

UNIV. OF NEW MEXICO  
GRADUATE SCHOOL

3.0254 SEISMIC DESIGN OF BUILDING STRUCTURES.

J.T. YAO

UNIV. OF OREGON  
SCHOOL OF LIBERAL ARTS

3.0266 SEISMICITY INVESTIGATIONS IN THE CASCADE  
MOUNTAINS AND VICINITY, OREGON, 01 MAY 1969 -  
30 APRIL 1970.

H.R. BLANK

UNIV. OF SOUTHERN CALIFORNIA  
SCHOOL OF ENGINEERING

3.0038 IMPACT VIBRATION DAMPERS IN A SEISMIC  
DESIGN.

S.F. MASRI

UNIV. OF SOUTHERN CALIFORNIA  
SCHOOL OF LETTERS

3.0104 MICROEARTHQUAKE MONITORING IN LOS AN-  
GELES AREA.

T. TENG

UNIV. OF TEXAS  
GRADUATE SCHOOL

3.0273 INFLUENCE OF SHAPE AND EMBEDMENT ON  
DYNAMIC FOUNDATION RESPONSE.

K.H. STOKOE

UNIV. OF WASHINGTON  
SCHOOL OF ARTS

3.0279 DYNAMIC STABILITY OF EARTH

3.0280 A STUDY OF SEISMICITY  
STRUCTURE IN WESTERN WASH  
SEISMIC TELEMETRY NETWORK.

3.0283 SEISMIC ACTIVITY OF THE  
CANOES.

UNIV. OF WASHINGTON  
SCHOOL OF ENGINEERING

3.0281 BUILDING STANDARDS  
EARTHQUAKE HAZARD FOR THE  
BASIN.

3.0282 SEISMIC RESISTANCE OF CO  
COLUMN AND WALL CONNECTION

UNKNOWN INST. OR INDIV

3.0284 DEMONSTRATION OF A  
LIMITING THE SUBSIDENCE OF L  
DONED MINES ROCK SPRINGS, WY

VIRGINIA POLYTECHNIC IN  
SCHOOL OF ARTS

3.0277 SEISMICITY STUDIES OF THE  
PALACHIAN REGION.

EXPANSIVE SOILS

STATE DIV. OF MINES & CO

4.0001 URBAN GEOLOGY PLAN FOR  
THE NATURE, MAGNITUDE, & CO  
HAZARDS & RECOMMENDATION  
MITIGATION (ABBREV).

DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE  
TO MILITARY FACILITIES (ABBREV).

*L.D. JOHNSON*

4.0003 REVIEW OF LITERATURE ON EXPANSIVE CLAY  
SOILS,

*L.D. JOHNSON*

**U.S. DEPT. OF THE INTERIOR  
BUREAU OF RECLAMATION**

4.0007 STABILIZATION OF EXPANSIVE CLAYS AND  
SHALES,

*R.D. RICHMOND*

**U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY**

4.0004 GEOLOGY OF THE RAPID CITY AREA, SOUTH  
DAKOTA,

*J.M. CATTERMOLLE*

4.0005 DENVER URBAN CORRIDOR STUDIES -  
COLORADO,

*W.R. HANSEN*

4.0006 SURFICIAL GEOLOGY OF JUNEAU AND VICINI-  
TY URBAN AREA, ALASKA,

*R.D. MILLER*

**UNIV. OF DENVER  
GRADUATE SCHOOL**

4.0008 UNIVERSITY-INDUSTRY WORKSHOP ON  
HAZARDS AND DAMAGE RELATED TO EXPANSIVE  
EARTH MATERIALS,

*D. RICHARD*

**UNIV. OF SOUTHERN MISSISSIPPI  
SCHOOL OF SCIENCE**

4.0009 MAPPING OF SURFACE MATERIALS FOR PRE-  
DICTING FOUNDATION CHARACTERISTICS IN FU-  
TURE DEVELOPMENT OF HATTIESBURG,

*B.W. BROWN*

**FOREST & GRASS FIRES**

**AUBURN UNIVERSITY  
AGRICULTURAL EXPERIMENT STA.**

5.0001 PROFILING THE FOREST INCENDIARIST - AN  
ANALYSIS OF DOCUMENTED CASE HISTORIES,

*J.E. DUNKELBERGER*

**COLORADO STATE UNIVERSITY  
U.S.D.A. ROCKY MTN. FOR. STA.**

5.0027 NATIONAL FIRE DANGER RATING,

*J.W. LANCASTER*

TIONAL PARK, MONTANA,

*R.H. WHITTAKER*

**I I T RESEARCH INSTITUTE**

5.0044 DEVELOPMENT OF EMISSION FACTORS FOR  
ESTIMATING ATMOSPHERIC EMISSIONS,

*G. YAMATE*

**INST. FOR DEFENSE ANALYSIS**

5.0023 NATURAL DISASTERS OPERATIONS PLANNING  
FOR SLOWLY DEVELOPING DISASTERS, VOLUME I,

*A. SACHS*

**MICHIGAN STATE UNIVERSITY  
U.S.D.A. N. CEN. FOR. EX. STA.**

5.0014 FIRE CONTROL PLANNING AND FIRE PREVEN-  
TION IN THE NORTHEASTERN UNITED STATES,

*V.J. JOHNSON*

**MISSISSIPPI ST. UNIVERSITY  
U.S.D.A. S. FOREST EXPT. STA.**

5.0017 RESEARCH AND DEVELOPMENT OF FIRE  
PREVENTION TECHNOLOGY (FIRE PREVENTION),

*M.L. DOOLITTLE*

**NATL. ACAD. OF SCIENCES**

5.0008 CONTRACT FOR PARTIAL SUPPORT OF THE  
COMMITTEE ON FIRE RESEARCH,

*N.T. GRISAMORE*

5.0009 EMPLOYMENT OF AIR OPERATIONS IN THE  
FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM,  
HELD AT ARGONNE NATIONAL LABORATORY (AB-  
BREV),

*UNKNOWN*

**NORTHERN ARIZ. UNIVERSITY  
U.S.D.A. RKY. MTN. FOREST STA.**

5.0002 PRESCRIBED FIRE TECHNOLOGY FOR THE  
SOUTHWEST,

*A.W. LINDENMUTH*

**OLD DOMINION UNIVERSITY  
GRADUATE SCHOOL**

5.0032 CORRELATION OF SATELLITE AND GROUND  
DATA IN AIR POLLUTION STUDIES (ABBREV),

*G.E. COPELAND*

**SMITHSONIAN INSTITUTION**

5.0013 STUDIES OF IMAGES OF SHORT-LIVED EVENTS  
USING ERTS DATA - ALASKA,

*W.A. DEUTSCHMAN*



STATE DIV. OF MINES & GEOLOGY  
 5.0026 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
 THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC  
 HAZARDS & RECOMMENDATIONS FOR THEIR  
 MITIGATION (ABBREVI),

J.T. ALFORE

TEXAS TECHNOLOGICAL UNIVERSITY  
 SCHOOL OF AGRICULTURE  
 5.0022 EFFECT OF PRESCRIBED BURNING ON WATER  
 YIELD AND QUALITY FROM BRUSH INFESTED LANDS  
 - TEXAS,

H.A. WRIGHT

U.S. AIR FORCE  
 FOREIGN TECHNOLOGY DIVISION  
 5.0030 THE DETECTION OF CENTERS OF COMBUSTION  
 OF SMALL DIMENSIONS BY THE METHOD OF IR  
 PHOTOGRAPHY,

V.I. BINENKO

U.S. DEPT. OF AGRICULTURE  
 DIV. OF ADMINISTRATIVE MGMT.  
 5.0010 A STUDY OF FOREST SERVICE TELECOMMUNI-  
 CATIONS - VOLUME I - SUMMARY - MAIN STUDY  
 RECOMMENDATIONS AND FINDINGS,

UNKNOWN

U.S. DEPT. OF AGRICULTURE  
 INTERMTN. FOR. & RG. EXP. STA.  
 5.0018 PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL  
 PROPERTIES OF FUELS RELATED TO FIRE  
 PHENOMENA,

H.E. ANDERSON

5.0019 METHODS FOR THE PREVENTION AND CON-  
 TROL OF LIGHTNING FIRES,

R.G. BAUGHMAN

5.0020 CONTROL AND USE OF FIRE PARTICULARLY  
 IN WILDERNESS, PARK, AND OTHER RECREATIONAL  
 AREAS,

C.E. HARDY

5.0046 FIRE SURVEILLANCE SYSTEMS FOR THE DE-  
 TECTION AND MAPPING OF FIRES,

S.N. HIRSCH

U.S. DEPT. OF AGRICULTURE  
 NORTH CEN. FOREST EXPT. STA.  
 5.0015 FOREST FIRES IN MISSOURI,  
 5.0016 FIRE WEATHER & BEHAVIOR OF THE LITTLE  
 SIOUX FIRE - MINNESOTA,

R.W. SANDO

U.S. DEPT. OF AGRICULTURE  
 NORTHERN FOREST FIRE LAB.  
 5.0028 AIRBORNE INFRARED FOREST FIRE  
 DETECTION SYSTEM,

R

U.S. DEPT. OF AGRICULTURE  
 PAC. S.W. FOR. & RG. EXP. STA.  
 5.0006 FOREST FIRE BEHAVIOR - CALIFORNIA  
 C.M. COLE  
 5.0007 FIRE MANAGEMENT SYSTEMS,  
 5.0040 FOREST FIRE METEOROLOGY IN THE  
 COASTAL REGION,

M.J. S

U.S. DEPT. OF AGRICULTURE  
 PAC. SW. FOR. & RG. EXPT. STA.  
 5.0003 PHYSICAL CHARACTERISTICS OF CALIFORNIA  
 A WILDLAND FUEL - CALIFORNIA,  
 C.M. COLE  
 5.0004 FIRE WEATHER AND FIRE BEHAVIOR  
 1968 CANYON FIRE - CALIFORNIA,  
 C.M. COLE  
 5.0005 GUIDES FOR FUEL-BREAKS IN THE  
 NEVADA MIXED-CONIFER TYPE,

L

5.0025 FIRE PREVENTION - CALIFORNIA,  
 W.S.

5.0033 FIRE ENVIRONMENTAL TEST CHAMBER  
 DESIGN AND DEVELOPMENT,

5.0034 FIRES CAUSED BY EQUIPMENT USE  
 CRITICAL FIRE WEATHER IN CALIFORNIA  
 1971,

G.C.

5.0035 ALLOCATION MODEL FOR FIRE  
 RESOURCES,

F.W.

5.0036 CHARACTERISTICS OF PEOPLE WHO  
 CAUSE FIRES ....SOME PRELIMINARY FINDINGS -  
 MINN.

J.R. CHR

5.0037 REDUCING FIRE HAZARD IN PONDEROSA  
 PINE THINNING SLASH BY MECHANICAL CHIPPING  
 OREGON,

5.0038 FOREST FIRE HISTORY - A COMPARATIVE  
 METHOD OF DATA ANALYSIS,

5.0039 PROBABILITY FIRE WEATHER FORECASTS  
 SHOW PROMISE IN 3-YEAR TRIAL,

P.G. S

U.S. DEPT. OF AGRICULTURE  
 S.E. FOREST EXPERIMENT STATION

5.0042 DEVELOPMENT OF IMPROVED TECHNIQUES  
FOR USING PRESCRIBED FIRE IN  
SOUTHERN FORESTS.

*R.W. COOPER*

5.0043 THE INFLUENCE OF WEATHER AND CLIMATE  
ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN  
THE EAST AND SOUTH.

*D.T. WILLIAMS*

U.S. DEPT. OF COMMERCE  
NATL. WEATHER SERVICE

5.0029 RADAR METEOROLOGY AS A MODERN TOOL  
FOR FOREST FIRE PROTECTION,

*D.W. KRUEGER*

5.0031 OPERATING PLAN FOR FIRE WEATHER SER-  
VICE IN SOUTH CAROLINA.

*J.D. KANUPP*

U.S. NAVY  
ORDNANCE LABORATORY

5.0012 THE GREAT OAKLAND, LOS ANGELES, AND  
SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970.

*R.S. ALGER*

UNIV. OF CALIFORNIA  
SCHOOL OF AGRICULTURE

5.0041 FOREST FIRE STATISTICAL PROBLEMS.

*F.N. DAVID*

UNIV. OF WASHINGTON  
SCHOOL OF ENGINEERING

5.0024 MECHANISMS OF WILDLAND FIRE SUPPRES-  
SION.

*R.C. CORLETT*

UNIV. OF WASHINGTON  
SCHOOL OF FORESTRY

5.0047 FIRE ON A FOREST SOIL.

*D.W. COLE*

FLOODS

ALBUQUERQUE URBAN OBSERVATORY

6.0128 FACTORS PERTINENT TO WATER QUALITY IN  
THE ALBUQUERQUE METROPOLITAN AREA.

*UNKNOWN*

AMER. SOC. OF CIVIL ENGRS.

6.0132 AN EVALUATION OF URBAN FLOOD PLAINS.

*J.E. GODDARD*

6.0138 HYDROLOGIC EFFECTS OF URBANIZATION IN

AUBURN UNIVERSITY  
CENTER FOR URBAN & REG. PL.

6.0157 STUDY OF GUIDELINES FOR LAND  
MENT AND USE OF FLOOD-PRONE  
ALABAMA.

AURORA PLANNING BOARD

6.0332 COMPREHENSIVE PLAN - REPORT  
MENTATION - VILLAGE OF EAST AURORA,  
TOWN OF AURORA, N.Y..

BOISE STATE COLLEGE  
SCHOOL OF ARTS

6.0003 SILVER VALLEY FLOOD - SOCIAL P  
ICAL EFFECTS.

BULLITT CO. PLANNING COMM

6.0286 FLOOD PLAN FOR BULLITT CO  
TUCKY.

CENTRAL NEW YORK REG. PLN.

6.0133 WATER RELATED ENVIRONMENTAL

CLATSOP TILLAMOOK INTERGO

6.0352 FLOOD PLAIN ANALYSIS AND DIS  
DY, CLATSOP AND TILLAMOOK COUNTI  
- 1972-1973.

CLYDE E. WILLIAMS & ASSOC. I

6.0268 ZONING ORDINANCE - KNOX CO  
ANA.

COLORADO STATE UNIVERSITY  
SCHOOL OF ENGINEERING

6.0050 FLOOD PROTECTION AT CULVERT

6.0189 INVESTIGATION FOR FLOOD PRO  
BRIDGES.

6.0190 HYDROLOGY OF SMALL WATERSH

CORNELL UNIVERSITY  
WATER RESOU. & MARINE SC. CTR.

- 6.0334 REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I.

D.J. ALLEE

- 6.0335 STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS.

J.R. FERGUSSON

COUNCIL ON INTERGOV. RELATIONS

- 6.0042 SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT,

UNKNOWN

- 6.0178 NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA.

J.P. KENNY

- 6.0179 GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971,

UNKNOWN

DIVERSIFIED CONSULTANTS INC.

- 6.0307 URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (ABBREV).

J.A. ELLIOTT

- 6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV).

J.A. ELLIOTT

EAST CENT. FLORIDA REG. COUN.

- 6.0072 ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT.

UNKNOWN

EASTERN PENN. PSYCH. INSTITUTE

- 6.0010 TRAINING AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA.

UNKNOWN

ENVIRONMENTAL RES. INST. MICH.

- 6.0298 USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS.

F.J. THOMSON

FED. CITY COLLEGE  
GRADUATE SCHOOL

- 6.0016 A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES.

F.F. CHANG

GENESEE FINGER LAKE REG. BOARD

GEORGIA INST. OF TECHNOLOGY  
ENVIRONMENTAL RESOURCES

- 6.0073 CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA - PHASE II

- 6.0074 CRITICAL ANALYSIS OF FLOOD CONTROL MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA.

- 6.0238 SYNTHESIZING A PROCEDURE FOR EVALUATING URBAN FLOOD CONTROL PROGRAMS

- 6.0239 THE FLOOD PLAIN AS A RESIDENTIAL DEVELOPMENT - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD MANAGEMENT POLICY.

- 6.0240 THE PEACHTREE CREEK WATERSHED - CASE HISTORY IN URBAN FLOOD MANAGEMENT.

- 6.0241 TRAVEL TIME OF GEORGIA STATE HIGHWAYS

- 6.0242 THE EFFECTS OF LAND USE CHANGES ON THE HYDROLOGY OF AN URBAN WATERSHED

- 6.0243 A PROGRAM FOR METROPOLITAN WATER MANAGEMENT.

GLENDORA CITY GOVERNMENT

- 6.0170 GLENDORA, CALIFORNIA, GROUNDWATER MONITORING, 1990.

HAZLETON NANTICOKE M.H.

- 6.0009 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE COUNTY OF THE COMMONWEALTH OF PENNSYLVANIA.

HYDROCOMP INTERNATIONAL

- 6.0177 PROCEDURES FOR ESTIMATING FLOOD DAMAGE FROM SMALL RURAL WATERSHEDS.

I N T A S A INCORPORATED

- 6.0173 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DEVELOPMENT AND APPLICATIONS.

- 6.0174 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - MODEL DEVELOPMENT AND BENEFIT EVALUATION.

- 6.0175 PLAN FORMULATION AND

INST. FOR DEFENSE ANALYSIS

- 6.0032 NATURAL DISASTERS OPERATIONS PLANNING  
FOR SLOWLY DEVELOPING DISASTERS, VOLUME 1,  
A. SACHS

INTERNAT. JOINT COMMISSION

- 6.0052 REGULATION OF GREAT LAKES WATER  
LEVELS REPORT TO THE INTERNATIONAL  
JOINT COMMISSION BY THE INTERNATIONAL GREAT  
LAKES LEVELS BOARD,  
UNKNOWN

IOWA STATE UNIVERSITY  
WATER RESOURCES RESEARCH INST.

- 6.0089 PLANT SPECIES AS WILDLIFE COVER AND  
EROSION CONTROL ON 'MUDFLATS' IN IOWA'S  
LARGE RESERVOIR SYSTEMS,  
J.A. WILSON  
6.0272 ECONOMIC FACTORS AFFECTING CHANGE IN  
THE INTENSITY OF FLOOD PLAIN USE,  
J.R. BARNARD  
6.0273 THE HUMAN ECOLOGICAL IMPACT OF STRUC-  
TURAL FLOOD CONTROL ON THE IOWA RIVER,  
IOWA,  
J.S. GARDNER

LINCOLN CO. PLANNING DEPT.

- 6.0354 DEVELOPMENT IN FLOOD-PRONE AREAS OF  
LINCOLN COUNTY, OREGON AUGUST, 1973,  
UNKNOWN

LOCKWOOD ANDREWS & NEWMAN INC.

- 6.0385 PALACIOS COMPREHENSIVE PLAN - PHASE 2 -  
SUMMARY REPORT,  
G.L. WILLIAMS

LOWER MINN. RIV. WTRSHED DIST.

- 6.0302 THE EFFECTIVENESS OF FLOOD CONTROL  
STRUCTURE OF THE LOWER MINNESOTA RIVER  
WATERSHED DISTRICT,  
UNKNOWN

LUZERNE WYOMING CO. M.H. PROG.

- 6.0011 MENTAL HEALTH SERVICES TO RESIDENTS OF  
FLOOD DISASTER AREAS IN LUZERNE-WYOMING  
COUNTIES, COMMONWEALTH OF PENNSYLVANIA,  
UNKNOWN

MACON CO. REGIONAL PLAN COMM.

- 6.0258 NATURAL CAPABILITIES - THE FRIENDS CREEK  
SERIES, MACON COUNTY, ILLINOIS,  
UNKNOWN

MASS. INST. OF TECHNOLOGY  
SCHOOL OF ENGINEERING

- 6.0107 DESIGN OF OPTIMAL PRECIPITATION NET-  
WORKS,

W.M. GRAYMAN

MATHEMATICA INCORPORATED

- 6.0101 THE IMPLICATIONS OF THE NET FISCAL  
BENEFITS CRITERION FOR COST SHARING IN FLOOD  
CONTROL PROJECTS,  
R.W. RAFUSE

MIDDLE GEORGIA AREA PLAN. COM.

- 6.0245 WATER RESOURCES OF MIDDLE GEORGIA,  
UNKNOWN

MISSISSIPPI ST. UNIVERSITY  
GRADUATE SCHOOL

- 6.0007 CASE STUDY OF ECONOMIC ASPECTS OF THE  
FEDERAL FLOOD INSURANCE PROGRAM,  
L.R. CHEATHAM

MONTANA STATE UNIVERSITY  
SCHOOL OF ENGINEERING

- 6.0125 APPLICATION OF HYDROLOGIC AND HYDRAU-  
LIC RESEARCH TO CULVERT SELECTION IN MON-  
TANA - VOLUME 1 - REPORT,  
E.R. DODGE

MONTANA STATE UNIVERSITY  
WATER RESOURCES RESEARCH CTR.

- 6.0126 DEVELOPMENT OF AN OPERATIONS MODEL  
FOR MONTANA'S WATER RESOURCES, MID-  
DLE CREEK RESERVOIR OPERATION,  
T.T. WILLIAMS  
6.0321 FLOODPLAIN MAPPING AND PLANNING FOR  
THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF  
THE BITTERROOT VALLEY, MONTANA,  
K.M. NOLAN

NORTH AMER. WEATHER CONSULT.

- 6.0171 CLOUD SEEDING POTENTIAL FOR TWELVE  
RIVER BASINS,  
R.D. ELLIOTT

NORTH KENNEBEC REG. PLN. COMM.

- 6.0288 DATA AND MANAGEMENT NEEDS FOR WATER  
RELATED LAND AREAS - MAINE,  
E. KEENE

NORTHWESTERN UNIVERSITY  
SCHOOL OF TECHNOLOGY

- 6.0259 RESEARCH INITIATION - A MULTIDIMENSIONAL STOCHASTIC MODEL FOR FLOOD PREDICTION,

R.B. COROTIS

OHIO STATE UNIVERSITY  
SCHOOL OF ENGINEERING

- 6.0345 COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES,

G.M. CLARK

- 6.0346 APPLICATION OF COST-EFFECTIVENESS TO THE DESIGN OF A FLOOD PLAIN,

G.M. CLARK

- 6.0347 DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM,

G.M. CLARK

- 6.0348 STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY,

V.T. RILCA

OREGON STATE UNIVERSITY  
WATER RESOURCES RESEARCH INST.

- 6.0353 A COMPILATION OF FLOOD ABATEMENT PROJECTS IN OREGON,

R.E. EMMER

PALM BEACH CO. AREA PLAN. BD.

- 6.0235 FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE,

UNKNOWN

- 6.0236 FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972,

UNKNOWN

PENN. STATE UNIVERSITY  
INST. RES. LAND & WTR. RESOUR.

- 6.0144 OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,

B.M. REICH

- 6.0146 FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS,

B.M. REICH

- 6.0360 SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR,

S.M. LEADLEY

- 6.0361 EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA,

B.M. REICH

PENN. STATE UNIVERSITY  
SCHOOL OF ENGINEERING

- 6.0145 FLOOD PREDICTION METHODS FOR PENNSYLVANIA

PURDUE UNIVERSITY  
SCHOOL OF CIVIL ENGINEERING

- 6.0271 WABASH RIVER SYSTEMS MODEL FOR PROJECT MANAGEMENT, PLANNING AND DESIGN,

PURDUE UNIVERSITY  
SCHOOL OF ENGINEERING

- 6.0270 THE EFFECT OF URBANIZATION ON THE HYDROLOGY OF WATERSHEDS - INDIANA,

PURDUE UNIVERSITY  
WATER RESOURCES RESEARCH CENTER

- 6.0088 INITIAL RESULTS FROM THE FLOOD SIMULATION MODEL,

- 6.0269 HYDRAULICS OF SHALLOW FLOODS ON BLE ERODED SAND SURFACES DETERMINED BY SPECTRA,

RESOURCES DEVELOPMENT CENTER

- 6.0191 SOCIALLY DEFINED ENVIRONMENTAL PROBLEMS IN URBAN WATER RESOURCES PLANNING,

RUTGERS THE STATE UNIVERSITY  
AGRICULTURAL EXPERIMENT STATION

- 6.0323 HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY,

RUTGERS THE STATE UNIVERSITY  
WATER RESOURCES RESEARCH CENTER

- 6.0324 ECONOMIC BASIS FOR WATER RESOURCES ANALYSIS,

SAN DIEGO CO. COMP. PLAN. DIV.

- 6.0046 DRAINAGE AND FLOOD CONTROL - BACKGROUND AND POLICY STUDY - SAN DIEGO COUNTY,

- 6.0047 INITIAL WATER, SEWERAGE AND SANITATION STUDY - SAN DIEGO COUNTY,

SAN DIEGO REG. COMP. PLAN. DIV.

- 6.0181 DRAINAGE AND FLOOD CONTROL - BACKGROUND AND POLICY STUDY - SAN DIEGO COUNTY,

SOUTH ALABAMA REG. PLAN. DIV.

- 6.0158 A GUIDE FOR REDUCING FLOOD DAMAGE - SOUTH ALABAMA REGION,

SOUTH DAKOTA STATE UNIVERSITY  
REMOTE SENSING INSTITUTE6.0030 MONITORING FLOOD DAMAGE WITH SATEL-  
LITE IMAGERY,

L.A. BENSON

## SOUTHWESTERN ILL. PLAN. COMM.

6.0084 BACKGROUND SURVEY - SURFACE DRAINAGE  
PROGRAM, MADISON, ST. CLAIR, MONROE AND  
RANDOLPH COUNTIES, ILLINOIS,

UNKNOWN

## STATE COMM. &amp; AREA DEV. DIV.

6.0309 ZONING ORDINANCE AND SUBDIVISION REGU-  
LATIONS, FRIARS POINT, MISSISSIPPI,

P.J. BARLOW

## STATE DEPT. OF BUS. &amp; DEV.

6.0262 PRIORITY AND PLANNING ELEMENTS FOR  
DEVELOPING ILLINOIS WATER RESOURCES,

UNKNOWN

## STATE DEPT. OF COMMUNITY AFFS.

6.0295 RE-DRAFT OF SEEKONK ZONING BY LAW, 15  
NOVEMBER 1969,

J. BLACKWELL

## STATE DEPT. OF ENV. CONSERV.

6.0130 REGIONAL COMPREHENSIVE MULTI-PURPOSE  
WATER RESOURCES PLANNING STUDIES IN NEW  
YORK,

J.A. FINCK

6.0131 USE OF SYSTEMS ANALYSIS IN THE DEVELOP-  
MENT OF WATER RESOURCES MANAGEMENT PLANS  
FOR NEW YORK STATE - ADDENDUM,

C.S. LIU

## STATE DEPT. OF PUB. WELFARE

6.0008 MENTAL HEALTH SERVICES TO RESIDENTS OF  
FLOOD DISASTER AREAS IN CENTRAL REGION, COM-  
MONWEALTH OF PENNSYLVANIA,

UNKNOWN

## STATE DEPT. OF TRANSPORTATION

6.0043 FLOODS FROM SMALL DRAINAGE AREAS IN  
CALIFORNIA,

A.O. WAANANEN

## STATE DEPT. OF WATER RESOURCES

6.0044 SOUTH COASTAL BASIN PRECIPITATION  
FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-DU-  
RATION FREQUENCY OF SHORT-DURATION  
PRECIPITATION IN CALIFORNIA,

J.D. GOODRIDGE

## STATE DIV. OF MINES &amp; GEOLOGY

6.0045 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV),

J.T. ALFORE

## STATE DIV. OF VOC. REHAB.

6.0014 DELIVERING VOCATIONAL REHABILITATION  
SERVICES IN A DISASTER AREA,

W.R. PHELPS

## STATE DIV. OF WATER RESOURCES

6.0328 THE USE OF SYSTEMS ANALYSIS IN THE  
DEVELOPMENT OF WATER RESOURCES MANAGE-  
MENT PLANS FOR NEW YORK STATE - VOLUME I,

A.C. TEDROW

## STATE GEOL. SURVEY

6.0035 ELEMENTS OF THE WATER RESOURCES SITUA-  
TION IN ALABAMA,

D.B. KNOWLES

## STATE HIGHWAY COMMISSION

6.0287 SMALL STREAMS FLOOD FREQUENCY IN  
MAINE,

G.S. HAYES

## STATE OFF. OF PLAN. SERVICES

6.0329 STREAMS AND DRAINAGE BASINS - FULTON  
COUNTY, NEW YORK,

UNKNOWN

6.0330 PUTNAM COUNTY OFFICIAL MAP - PROPOSALS  
FOR REVISION AND EXPANSION,

UNKNOWN

## STATE PLANNING &amp; COM. AFF. AGY

6.0253 NATURAL DISASTER ANALYSIS FOR LATAH  
COUNTY, IDAHO, JUNE 1973,

H.W. LEE

## STATE PLANNING &amp; GRANTS DIV.

6.0363 MYRTLE BEACH, S.C. - COMPREHENSIVE  
DEVELOPMENT PLAN,

UNKNOWN

## STATE PLANNING BOARD

6.0362 FLOOD CONTROL STUDY OF RIO GRANDE DE  
MANATI, MANATI AND BARCELONETA, PUERTO  
RICO,

UNKNOWN

## STATE PLANNING COMMISSION

6.0369 ZONING ORDINANCE, HUNTINGDON, TENNES-  
SEE,

UNKNOWN

6.0284 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY.

UNKNOWN

STATE UNIVERSITY OF NEW YORK  
AGRICULTURAL EXPERIMENT STA.

6.0336 THE POLITICAL ECONOMY OF WATER  
RESOURCES.

DJ ALLEE

6.0337 APPLICATION OF LUNR SYSTEM TO FLOOD  
PLAIN ANALYSIS AND MANAGEMENT IN  
THE OSUSQUEHANNA RIVER BASIN.

J.W. KELLEY

STATE WATER RESOUR. BOARD

6.0350 APPRAISAL OF THE WATER AND RELATED  
LAND RESOURCES OF OKLAHOMA - REGION EIGHT -  
1971.

UNKNOWN

6.0351 APPRAISAL OF THE WATER AND RELATED  
LAND RESOURCES OF OKLAHOMA.

UNKNOWN

STATE WATER SURVEY

6.0263 STREAMFLOW VARIABILITY - ILLINOIS.

K.P. SINGH

STEPHENSON CO. PLANNING COMM.

6.0260 A COMPREHENSIVE PLAN FOR STEPHENSON  
COUNTY, ILLINOIS.

UNKNOWN

TAMPA BAY REGIONAL PLAN. COUN.

6.0231 SARASOTA - ZONING AND SUBDIVISION CON-  
TROLS - REVIEW, ANALYSIS, AND RECOMMENDA-  
TIONS CONCERNING CURRENT REGULATIONS.

E.R. BARTLEY

6.0232 ZONING REGULATIONS OF THE CITY OF  
SARASOTA, FLORIDA.

UNKNOWN

TEXAS A & M UNIVERSITY SYSTEM  
SCHOOL OF ENGINEERING

6.0151 ALTERNATE SOLUTIONS TO WATER  
RESOURCE DEVELOPMENT - A CASE STUDY - TEXAS.

D.R. BASCO

TEXAS A & M UNIVERSITY SYSTEM  
WATER RESOURCES INSTITUTE

6.0379 WATER FOR TEXAS - URBAN WATER  
RESOURCES PLANNING AND MANAGEMENT - THE  
PROCEEDINGS OF THE ANNUAL CONFERENCE HELD  
AT SAN ANTONIO (ABBREV).

UNKNOWN

TEXAS TECHNOLOGICAL UNIVERSITY  
WATER RESOURCES CENTER

6.0382 VARIATION OF URBAN RUNOFF WITH DRAINAGE

TEXAS REGIONAL PLANNING COMM.  
6.0381 SOIL AND WATER CONSERVATION NEEDS IN-  
VENTORY, COOKE, GRAYSON AND FANNIN COUN-  
TIES, TEXAS.

UNKNOWN

TUSCALOOSA AREA COUN. OF GOV.

6.0159 FLOOD MANAGEMENT STUDY.

UNKNOWN

6.0160 FLOOD MANAGEMENT STUDY - TUSCALOOSA,  
PICKENS COUNTY AND MOUNDSVILLE, ALABAMA,  
MAY 1971.

UNKNOWN

U.S. AIR FORCE  
AIR WEATHER SERVICE

6.0081 WATER WARNINGS AND SPECIALIZED  
FORECASTS.

UNKNOWN

U.S. ARMY  
CORPS OF ENGINEERS

6.0053 CHENA RIVER LAKES PROJECT, ALASKA -  
PROBLEMS RELATING TO CHANNEL DEVELOPMENT,  
EROSION, & BANK & LEVEE PROTECTION.

C.P. LINDNER

6.0054 JACKSON HOLE FLOOD CONTROL PROJECT.

UNKNOWN

6.0405 FLOOD HAZARD INFORMATION - BUFFALO  
CREEK, LOGAN COUNTY, WEST VIRGINIA POST-DIS-  
ASTER CONDITIONS.

UNKNOWN

U.S. ARMY  
ENGINEER DISTRICT

6.0033 SPEWRELL BLUFF LAKE, FLINT RIVER, GEOR-  
GIA.

UNKNOWN

6.0096 GRAND ISLE, LOUISIANA, AND VICINITY HUR-  
RICANE PROTECTION ASSOCIATED WATER FEAT-  
URE, BAYOU LAFOURCHE - LOUISIANA (ABBREV).

UNKNOWN

6.0097 NEW ORLEANS TO VENICE, LOUISIANA, HUR-  
RICANE PROTECTION.

UNKNOWN

6.0098 LAKE PONTCHARTRAIN, LOUISIANA AND  
VICINITY - HURRICANE PROTECTION PROJECT.

UNKNOWN

6.0099 MORGAN CITY, LOUISIANA, AND VICINITY  
(FRANKLIN AND VICINITY AREA).

UNKNOWN

6.0100 RED RIVER EMERGENCY BANK PROTECTION,  
LOUISIANA, ARKANSAS, AND TEXAS.

UNKNOWN

6.0141 BIG HILL LAKE, BIG HILL CREEK, KANSAS.

UNKNOWN

6.0142 BIRCH LAKE, BIRCH CREEK, OKLAHOMA.

UNKNOWN

6.0172 SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT,

UNKNOWN

6.0315 FORT SCOTT LAKE, MARMATON RIVER, KANSAS,

UNKNOWN

6.0320 MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI,

UNKNOWN

6.0358 FLOOD-PROOFING REGULATIONS,

UNKNOWN

U.S. ARMY  
ENGINEERING DIVISION

6.0095 HYDROLOGIC STUDIES (STORM STUDIES),

B.J. GARRETT

U.S. ARMY  
HYDROLOGIC ENGINEERING CENTER

6.0037 HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES,

L.R. BEARD

6.0038 RESERVOIR SYSTEMS ANALYSIS FOR FLOOD CONTROL,

B.S. EICHERT

6.0167 STOCHASTIC HYDROLOGY,

H.E. KUBIK

U.S. ARMY  
LOWER MISS. VALLEY DIV.

6.0121 FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER VALLEY,

UNKNOWN

U.S. ARMY  
NEW ENGLAND DIVISION

6.0108 HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT,

UNKNOWN

6.0109 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS,

UNKNOWN

6.0110 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS,

UNKNOWN

6.0111 NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT,

UNKNOWN

U.S. ARMY  
WATERWAYS EXPERIMENT STATION

6.0116 DESIGN FOR FLOOD CONTROL AND PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION,

C.E.

6.0117 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION,

G.A.

6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION,

G.A.

6.0119 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES,

H.B.

6.0120 FLOOD-CONTROL PROJECT HOOSIATUCK RIVER, NORTH ADAMS MASSACHUSETTS,

6.0312 MODEL STUDY OF CANNELTON LOCK AND DAM, OHIO RIVER, INDIANA AND KENTUCKY,

J.

6.0313 MISSISSIPPI BASIN MODEL,

6.0314 DEMONSTRATION OF THE ELECTRIC MODEL OF THE KANSAS RIVER AT THE UNIVERSITY OF CALIFORNIA IN BERKELEY,

U.S. COASTAL BEND REG. COMM.

6.0380 OSO CREEK TECHNICAL ASSISTANCE PROJECT - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY,

U.S. DEPT. OF AGRICULTURE  
BLACKLAND EXPERIMENT WATERSHED

6.0388 RELATION OF CLIMATIC AND WATER RESOURCES CHARACTERISTICS TO STORM RUNOFF IN THE BLACKLANDS PLATEAU - TEXAS,

W.

U.S. DEPT. OF AGRICULTURE  
NATURAL RESOURCE ECON. DIV.

6.0194 ANALYSIS OF LAND USE CONTROL MEASURES FOR FLOOD PROTECTION,

W.D.

U.S. DEPT. OF AGRICULTURE  
PAC. S.W. FOR. & RG. EXP. STA.



U.S. DEPT. OF AGRICULTURE  
SOIL CONSERVATION SERVICE

6.0055 HURRICANE CREEK WATERSHED PROJECT,  
HUMPHREYS AND DICKSON COUNTIES, TENNESSEE,  
UNKNOWN

6.0195 KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES,  
UNKNOWN

6.0196 UNION CREEK WATERSHED PROJECT, SOUTH  
DAKOTA,  
UNKNOWN

6.0197 HOLLOW CREEK WATERSHED PROJECT,  
SOUTH CAROLINA,  
UNKNOWN

6.0198 KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES,  
UNKNOWN

6.0199 NUTWOOD WATERSHED, ILLINOIS,  
UNKNOWN

6.0200 HURRICANE CREEK WATERSHED STRUCTURAL  
PROJECT MEASURE, KENTUCKY,  
UNKNOWN

6.0201 CORNUDAS, NORTH AND CULP DRAWS  
WATERSHED, HUDSPETH COUNTY, TEXAS, AND  
OTERO COUNTY, NEW MEXICO,  
UNKNOWN

6.0202 BIG CREEK WATERSHED, KANSAS,  
UNKNOWN

6.0203 MACADOO ROAD-FILL DAM, KANSAS,  
UNKNOWN

6.0204 STARKWEATHER WATERSHED, NORTH  
DAKOTA,  
UNKNOWN

6.0205 VERDE LANE FLOOD PREVENTION PROJECT  
MEASURE, NEBRASKA,  
UNKNOWN

6.0206 WHITEWATER CREEK HYDROLOGIC UNIT PRO-  
JECT MEASURE, CHEROKEE HILLS RC AND D PRO-  
JECT, OKLAHOMA,  
UNKNOWN

U.S. DEPT. OF COMMERCE  
EQUIPMENT DEVELOPMENT LAB.

6.0104 HYDROLOGIC EQUIPMENT - FLASH FLOOD  
ALARM SYSTEM,  
W. STAATS

U.S. DEPT. OF COMMERCE  
LIMNOLOGY DIVISION

6.0207 LAKE HYDROLOGY,  
L. BAJORUNAS

U.S. DEPT. OF COMMERCE  
NATIONAL WEATHER SERVICE

6.0103 HYDROLOGIC DATA COLLEC-  
TIONARY SATELLITE,

6.0290 PROBABLE MAXIMUM PRECIPITATION  
SNOWMELT CRITERIA FOR RED RIVER  
NORTH ABOVE PEMBINA AND SOURS  
MINOT, NORTH DAKOTA,

U.S. DEPT. OF COMMERCE  
NATL. BUREAU OF STANDARDS

6.0001 DISASTER INVESTIGATIONS,

U.S. DEPT. OF COMMERCE  
NATL. OCEANIC & ATMOSPHERIC ADMINISTRATION

6.0056 BLACK HILLS FLOOD OF JUNE 1950,

6.0057 ESSA AND OPERATION FORECASTER

6.0289 CLIMATES OF THE STATES - COLUMBIA  
YORK,

U.S. DEPT. OF COMMERCE  
NATL. WEATHER SERVICE

6.0391 FLASH FLOOD FORECASTING  
PROGRAM IN THE WESTERN REGION

U.S. DEPT. OF COMMERCE  
TECHNIQUES DEVELOPMENT

6.0006 FLOOD INSURANCE STUDY,

U.S. DEPT. OF COMMERCE  
WEATHER BUREAU

6.0021 METEOROLOGICAL AND  
ANALYSIS OF THE AUGUST 27-28, 1954  
FLOOD,

6.0022 THE METEOROLOGICAL AND  
ASPECTS OF THE MAY 1968 NEW JERSEY  
FLOOD,

U.S. DEPT. OF HOUSING & URBAN DEVELOPMENT  
COMM. DEV. DISASTER RECORD

6.0024 LOCK HAVEN URBAN REDEVELOPMENT  
LOCK HAVEN, PENNSYLVANIA,

6.0025 MODEL CITIES ONE - URBAN  
REDEVELOPMENT, READING, PENNSYLVANIA,

6.0029 KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C,

UNKNOWN

U.S. DEPT. OF HOU. & URB. DEV.  
SPECIAL RECOVERY OFFICE

6.0027 MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA,

UNKNOWN

6.0028 DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA,

UNKNOWN

U.S. DEPT. OF THE INTERIOR  
BUREAU OF RECLAMATION

6.0183 FLOOD HYDROLOGY INVESTIGATIONS,

F.A. BERTLE

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

6.0020 FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO,

L.A. WAITE

6.0023 FLOOD FREQUENCY AND HIGH-FLOW STUDIES,

UNKNOWN

6.0034 FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA,

C.O. MING

6.0039 EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA,

M.W. BUSBY

6.0048 FLOOD FREQUENCY IN URBAN AREAS, COLORADO,

G.L. DUCRET

6.0049 PEAK DISCHARGE AND FREQUENCY FOR SMALL WATERSHEDS IN COLORADO,

G.L. DUCRET

6.0058 FLOOD FLOWS FROM SMALL DRAINAGE AREAS,

J.D. CAMP

6.0059 INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO,

W.P. CROSS

6.0060 INFLOW HYDROGRAPH STUDY - WYOMING,

R. CUSHMAN

6.0061 PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS,

E.E. SCHROEDER

6.0062 FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA,

6.0064 COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA,

UNKNOWN

6.0065 FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI,

K.V. WILSON

6.0067 HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS),

H. KLEIN

6.0068 RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA,

W.A. PITT

6.0069 HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA,

UNKNOWN

6.0071 ESTUARINE HYDROLOGY OF TAMPA BAY,

C.R. GOODWIN

6.0075 FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA,

H.G. GOLDEN

6.0079 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO,

UNKNOWN

6.0082 FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS,

G.W. CURTIS

6.0090 STREAMFLOW CHARACTERISTICS, KANSAS,

R. HEDMAN

6.0091 FLOOD INVESTIGATIONS - HIGHWAY COMMISSION - KANSAS,

H.R. HEJL

6.0093 FLOOD-FREQUENCY STUDY - KENTUCKY,

C.H. HANNUM

6.0094 FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA,

UNKNOWN

6.0102 FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND,

UNKNOWN

6.0106 FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS,

C.G. JOHNSON

6.0114 BRIDGE SITE INVESTIGATIONS,

C.H. TATE

6.0115 SPECIAL FLOOD REPORTS - MISSISSIPPI,

C.H. TATE

6.0129 INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO,

A.G. SCOTT

6.0134 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA,

A.L. PUTNAM

6.0135 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA,

FLOODS  
6.0138 MAGNITUDE AND FREQUENCY OF FLOOD  
DISCHARGES FROM SMALL DRAINAGE BASINS, EF-  
FECTS OF DRAINAGE BASIN CHARACTERISTICS -  
NORTH DAKOTA,

O.A. CROSBY

6.0139 STATEWIDE FLOOD-FREQUENCY REPORT -  
OKLAHOMA,

V.B. SAUER

6.0140 INVESTIGATION AND ANALYSIS OF FLOODS  
FROM SMALL WATERSHEDS IN OKLAHOMA,

UNKNOWN

6.0143 TEST OF THE ERTS-DATA COLLECTION  
SYSTEM IN THE SUSQUEHANNA RIVER BASIN,

UNKNOWN

6.0147 FLOOD INVESTIGATIONS - TENNESSEE,

UNKNOWN

6.0149 HYDROLOGIC INVESTIGATION OF SMALL  
DRAINAGE AREAS IN TEXAS,

UNKNOWN

6.0156 RUNOFF SIMULATION,

UNKNOWN

6.0161 FLOODWAY EVALUATIONS BEFORE & AFTER  
CHANNEL MODIFICATIONS ASSUMING  
TOTAL METROPOLITAN DEVELOPMENT IN  
DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA,

A.L. KNIGHT

6.0164 APPLICATIONS OF AERIAL MEASUREMENTS  
TECHNIQUES,

M.L. BROWN

6.0165 DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES,

UNKNOWN

6.0168 PERRIS VALLEY URBAN HYDROLOGY STUDY,  
CALIFORNIA,

M.W. BUSBY

6.0169 URBAN HYDROLOGY OF POWAY VALLEY,  
CALIFORNIA,

J.A. SINGER

6.0176 FLOODS FROM SMALL DRAINAGE AREAS -  
CALIFORNIA,

A.O. WAAANANEN

6.0180 FLOOD-FREQUENCY RELATIONSHIPS FOR  
SMALL DRAINAGE AREAS - VIRGINIA,

E.M. MILLER

6.0184 DENVER METROPOLITAN AREA, COLORADO,

R.M. LINDVALL

6.0185 MOUNTAIN SOILS, FRONT RANGE URBAN COR-  
RIDOR,

K.L. PIERCE

6.0186 PEAK DISCHARGE AND FREQUENCY FOR  
SMALL WATERSHEDS IN COLORADO,

UNKNOWN

6.0187 FLOOD FREQUENCY IN URBAN AREAS -  
COLORADO,

UNKNOWN

6.0188 HAMILTON 2 DEGREE,

J.D. WELLS

6.0193 SMALL STREAM FLOOD CHARACTERISTICS,

PERFORMING  
6.0209 INVESTIGATION OF ERTS-A IM-  
PLICATION TO THEMATIC MAPPING  
RIVER,

6.0210 PEAK FLOW FROM SMALL DRA-  
CONNECTICUT,

6.0211 HYDROLOGY OF OUTSTANDING

6.0212 INVESTIGATION OF SCOUR A  
ALASKA,

6.0213 FLOOD FREQUENCY OF ALABAMA  
ALABAMA,

6.0214 FLOOD FREQUENCY SYNTHESIS  
STREAMS - ALABAMA,

6.0215 FLOOD-FREQUENCY AND BASIN  
RELATIONSHIPS IN SMALL DRAINAGE

6.0216 WATER RESOURCES INVESTIGATION

6.0217 INVESTIGATION ON ANALYSIS  
FROM SMALL WATERSHEDS IN OKLAHOMA

6.0218 IMPROVEMENT IN FLOOD-FREQUENCY  
YSIS,

6.0219 INVESTIGATION AND ANALYSIS  
HYDROGRAPHS FROM SMALL DRAINAGE  
SOUTH DAKOTA,

6.0220 DEVELOPMENT OF HYDROLOGIC  
WORKS IN URBAN AREAS,

6.0221 PROGRAM DESIGN-1971 - SAN FRANCISCO  
REGION ENVIRONMENT AND RESOURCE  
STUDY,

6.0222 INVESTIGATION AND ANALYSIS  
FROM SMALL DRAINAGE AREAS  
CAROLINA,

6.0230 GEOHYDROLOGIC CONDITIONS  
POTENTIALS IN THE SINK  
SOUTHWESTERN SEMINOLE COUNTY

6.0233 MAGNITUDE AND FREQUENCY  
SMALL DRAINAGE AREAS IN FLORIDA

6.0234 HYDROGRAPH MODEL STUDIES  
SEBOROUGH, ALABAMA, AND ANCLOTE  
FLORIDA,

6.0244 ATLANTA METROPOLITAN  
FLOOD RUNOFF CHARACTERISTICS -

- 6.0250 FLOOD PLAIN MAPPING IN HAWAII,  
R.H. NAKAHARA
- 6.0251 SPECIAL FLOOD-DATA COLLECTION - HAWAII,  
UNKNOWN
- 6.0254 MAGNITUDE AND FREQUENCY OF FLOODS IN  
SMALL DRAINAGE BASINS IN IDAHO,  
C.A. THOMAS
- 6.0255 DEPTH AND FREQUENCY OF FLOODS IN IL-  
LINOIS,  
J.D. CAMP
- 6.0256 FLOOD FREQUENCY STUDY ILLINOIS,  
J.M. CARNS
- 6.0261 FLOOD INUNDATION MAPPING, NORTHEAST-  
ERN ILLINOIS,  
A.W. NOEHRE
- 6.0274 FLOOD PROFILES OF IOWA STREAMS,  
O.G. LARA
- 6.0275 FLOOD PROFILES & FLOOD-PLAIN INFORMA-  
TION, LINN COUNTY, IOWA,  
O.G. LARA
- 6.0276 FLOOD PROFILES & FLOOD-PLAIN INFORMA-  
TION, CEDAR RAPIDS, IOWA,  
O.G. LARA
- 6.0277 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION FOR UNIVERSITY BRANCH, DRY RUN  
CREEK, CEDAR FALLS, IOWA,  
O.G. LARA
- 6.0278 FLOOD FREQUENCY, LOG-PEARSON TYPE III  
ANALYSIS - IOWA,  
O.G. LARA
- 6.0279 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION, CEDAR RAPIDS, IOWA,  
H.H. SCHWOB
- 6.0280 FLOOD PROFILES AND FLOOD-PLAIN INFOR-  
MATION, LINN COUNTY, IOWA,  
H.H. SCHWOB
- 6.0281 EFFECT OF URBANIZATION ON FLOOD RU-  
NOFF - WICHITA AREA, KANSAS,  
C.O. GEIGER
- 6.0282 EFFECT OF URBANIZATION ON FLOOD RU-  
NOFF - WICHITA AREA,  
D.B. RICHARDS
- 6.0296 FLOOD CHARACTERISTICS OF SMALL  
DRAINAGE BASINS IN VERMONT,  
C.G. JOHNSON
- 6.0297 FLOOD CHARACTERISTICS OF SMALL  
DRAINAGE BASINS IN RHODE ISLAND,  
C.G. JOHNSON
- 6.0303 WATER RESOURCES OF THE RED RIVER OF  
THE NORTH DRAINAGE BASIN IN MINNESOTA,  
R.W. MACLAY
- 6.0304 FLOOD PLAIN STUDIES--MINNESOTA,  
UNKNOWN
- 6.0305 FLOOD PLAIN MANAGEMENT STUDIES -  
LOWER MINNESOTA RIVER,  
UNKNOWN
- 6.0310 CITY OF JACKSON, MISSISSIPPI, WATER  
RESOURCES STUDY,  
UNKNOWN
- 6.0316 DEVELOPMENT OF MAGNITUDE AND  
FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL  
STREAMS OF MISSOURI,  
L.D. HAUTH
- 6.0317 HYDROLOGY OF STREAMS IN ST. LOUIS  
METROPOLITAN AREA,  
D.W. SPENCER
- 6.0318 STORAGE REQUIREMENTS TO CONTROL  
FLOOD FLOWS OF MISSOURI STREAMS,  
UNKNOWN
- 6.0319 HYDROLOGY OF STREAMS IN ST. LOUIS COUN-  
TY - MISSOURI,  
UNKNOWN
- 6.0325 FLOOD PLAIN AND PEAK FLOW STUDIES, NEW  
JERSEY,  
T.G. ROSS
- 6.0326 DETERMINATION OF FLOOD PEAKS, FLOOD  
PROFILES, & FLOOD INUNDATION - NEW JERSEY,  
UNKNOWN
- 6.0327 FLOOD FREQUENCY STUDY IN NEW MEXICO,  
UNKNOWN
- 6.0331 FLOOD INVESTIGATIONS - NEW YORK,  
B. DUNN
- 6.0342 EFFECTS OF URBANIZATION ON FLOODS IN  
CHARLOTTE, NORTH CAROLINA,  
W.H. EDDINS
- 6.0343 EFFECTS OF URBANIZATION ON FLOODS AT  
MORGANTON, NORTH CAROLINA,  
A.L. PUTNAM
- 6.0344 MAGNITUDE AND FREQUENCY OF FLOODS ON  
SMALL STREAMS - NORTH DAKOTA,  
O.A. CROSBY
- 6.0349 FLOOD HYDROLOGY OF SMALL DRAINAGE  
AREAS,  
E.E. WEBBER
- 6.0357 THE EFFECT OF GROUND-WATER CONDITIONS  
ON LOCAL FLOODING IN THE KINGSTON AREA,  
PENNSYLVANIA,  
UNKNOWN
- 6.0364 FLOOD PLAIN INUNDATION,  
UNKNOWN
- 6.0365 FLOOD FREQUENCY OF SMALL AREAS -  
SOUTH CAROLINA,  
UNKNOWN
- 6.0366 INVESTIGATION AND ANALYSIS OF FLOOD  
HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN  
SOUTH DAKOTA,  
UNKNOWN
- 6.0370 FLOODING OF SMALL STREAMS IN NASH-  
VILLE-DAVIDSON COUNTY AREA, TENNESSEE,  
L.C. CONN
- 6.0371 INVESTIGATION OF THE MAGNITUDE AND  
FREQUENCY OF FLOODS ON SMALL STREAMS IN  
TENNESSEE,  
H.C. WIBBEN
- 6.0372 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS,  
J.W. BOARD
- 6.0373 URBAN HYDROLOGY STUDIES OF SELECTED  
AREAS IN TEXAS - DALLAS, AUSTIN,  
J.D. BOARD

# FLOODS

PERFORMING

6.0375 HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS.

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6.0376 EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA.

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6.0377 URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS.

*UNKNOWN*

6.0382 URBAN HYDROLOGY STUDY, DALLAS, TEXAS.

*G.R. DEMPSTER*

6.0383 URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS.

*B.B. HAMPTON*

6.0384 URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS.

*B.C. MASSEY*

6.0386 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS.

*S.L. JOHNSON*

6.0389 URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS.

*R.D. STEGER*

6.0392 MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH.

*F.K. FIELDS*

6.0394 TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS.

*UNKNOWN*

6.0395 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA.

*UNKNOWN*

6.0400 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY.

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6.0401 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA.

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6.0403 FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON.

*J.E. CUMMANS*

6.0404 FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON.

*J.E. CUMMANS*

6.0407 REGIONAL FLOOD-FREQUENCY STUDY (PHASE II).

*D.C. CONGER*

6.0408 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN.

*P.A. KAMMERER*

6.0409 FLOOD INUNDATION STUDY, WISCONSIN.

U.S. EXEC. OFFICE OF THE  
OFF. OF EMERGENCY PREPAREDNESS

6.0002 THE FEDERAL RESPONSE TO  
AGNES; A REPORT TO THE SENATE  
PUBLIC WORKS, SUBCOMMITTEE ON  
LIEF.

U.S. TENNESSEE VALLEY

6.0368 BEECH RIVER WATERSHED  
SEE.

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DIV. OF WATER CONT. & PROTECTION

6.0367 DEVELOPMENT OF WATER  
MANAGEMENT METHODS - TENNESSEE

U.S. WATER RESOURCES COMMISSION

6.0223 STANDARDS FOR PLANNING  
LAND RESOURCES.

6.0224 A UNIFORM TECHNIQUE FOR  
FLOOD FLOW FREQUENCIES.

6.0225 FLOOD HAZARD EVALUATION  
FOR FEDERAL EXECUTIVE AGENCIES

6.0226 REGULATION OF FLOOD HAZARD  
REDUCE FLOOD LOSSES - VOLUME

6.0227 NEW ENGLAND RIVER BASIN  
ANNUAL REPORT, FISCAL YEAR 1970

6.0228 OHIO RIVER BASIN SURVEY,  
DEVELOPMENT PROGRAM, COMMUNITY  
CHAIRMAN, U. S. WATER RESOURCE  
BREV).

6.0229 FLOOD HAZARD EVALUATION  
FOR FEDERAL EXECUTIVE AGENCIES

UNION COUNTY PLANNING

6.0127 PRELIMINARY STORM DRAINAGE  
CONTROL PLAN - UNION COUNTY, IOWA

UNIV. OF ALASKA  
INST. OF WATER RESOURCES

6.0163 DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL.

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GRADUATE SCHOOL

6.0036 WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS.

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SCHOOL OF FORESTRY

6.0166 THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA.

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SCHOOL OF LETTERS

6.0182 SEA COAST PLANNING PROJECT - CALIFORNIA.

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CENTER FOR URBAN STUDIES

6.0257 COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT.

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DIVISION OF URBAN AFFAIRS

6.0051 A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION.

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SCHOOL OF AGRICULTURE

6.0066 AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMEE RIVER BASIN - FLORIDA.

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CLOUD PHYSICS OBSERVATORY

6.0246 SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III).

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SCHOOL OF ARTS

6.0252 HAWAII ENVIRONMENTAL SIMULATION MODEL.

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6.0076 URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII.

*Y. FOK*

6.0077 FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII.

*Y.S. FOK*

6.0078 INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS.

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WATER RESOURCES RESEARCH INST.

6.0080 A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO.

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AGRICULTURAL EXPERIMENT STA.

6.0085 LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES.

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6.0265 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS.

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SCHOOL OF ENGINEERING

6.0086 OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS.

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6.0264 EVALUATION OF FLOOD RISKS.

*V.T. CHOW*

6.0267 HYDROLOGIC MODELS OF THE GREAT LAKES.

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UNIV. OF ILLINOIS  
WATER RESOURCES CENTER

UNIV. OF IOWA  
SCHOOL OF LIBERAL ARTS

- 6.0018 URBAN GROWTH, RUNOFF, EXTERNALITIES,  
AND INCOME DISTRIBUTION EFFECTS IN RALSTON  
CREEK WATERSHEDS.

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WATER RESOURCES INSTITUTE

- 6.0004 FACTORS AFFECTING RELOCATION IN  
RESPONSE TO RESERVOIR DEVELOPMENT.

*R.J. BURDGE*

- 6.0019 THE GENERATION OF FLOOD DAMAGE TIME  
SEQUENCES.

*J.P. BREADEN*

- 6.0092 STREAMFLOW PATTERNS WATERSHED  
CHARACTERISTICS THROUGH USE OF OPSET - A  
SELF CALIBRATING VERSION OF STANFORD  
WATERSHED MODEL. (ABBREV).

*L.D. JAMES*

- 6.0285 OPSET - PROGRAM FOR COMPUTERIZED  
SELECTION OF WATERSHED PARAMETER  
VALUES FOR THE STANFORD WATERSHED MODEL.

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UNIV. OF MASSACHUSETTS  
MAN & HIS ENVIRONMENT INST.

- 6.0293 LEGAL ISSUES ON ECONOMIC UTILIZATION OF  
THE CONNECTICUT RIVER FLOOD PLAINS.

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SCHOOL OF AGRICULTURE

- 6.0291 ECONOMIC AND LEGAL ANALYSIS OF ALTER-  
NATIVE FLOOD CONTROL STRATEGIES.

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SCHOOL OF ARTS

- 6.0292 DETERMINATION OF DECISION MAKING  
PROCESSES IN WATER RESOURCE PLANNING AND  
DEVELOPMENT - THE CONNECTICUT RIVER BASIN.

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- 6.0105 FLOOD PROOFING DECISIONS UNDER UNCER-  
TAINTY - AN APPLICATION TO THE CONNECTICUT  
RIVER BASIN.

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UNIV. OF MIAMI  
SCHOOL OF MARINE SCIENCES

- 6.0070 STUDIES OF THE RED ALGAL  
BAY.

UNIV. OF MICHIGAN  
SCHOOL OF ENGINEERING

- 6.0112 RAINFALL-RUNOFF RELATION  
AND RURAL AREAS.

- 6.0299 PREDICTION OF THE MAG-  
FREQUENCIES OF FLOODS IN MICHIGAN.

UNIV. OF MINNESOTA  
SCHOOL OF AGRICULTURE

- 6.0306 SOCIO-ECONOMIC IMPLICATIONS  
NATIVE WATER RESOURCES POLICY IN MIN-  
NESOTA.

UNIV. OF MINNESOTA  
ST. ANTHONY FALLS HYDROLOGICAL

- 6.0113 FORECASTING RAINFALL AND  
FLOODS ON UPPER MIDWESTERN WATERSHEDS.

- 6.0301 FLOOD FORECASTING IN THE U.S.  
- DATA ASSEMBLY AND PRELIMINARY ANALYSIS.

UNIV. OF MINNESOTA  
WATER RESOURCES RESEARCH

- 6.0300 AN ECONOMIC ANALYSIS OF FLOOD  
REDUCTION ALTERNATIVES IN THE  
RIVER BASIN.

UNIV. OF MISSOURI  
SCHOOL OF ENGINEERING

- 6.0123 OPTIMIZATION OF OPERATION  
OF FLOOD CONTROL RESERVOIRS.

UNIV. OF MISSOURI  
WATER RESOURCES RESEARCH

- 6.0122 SPILLWAY DESIGN FLOODS FOR  
IN RURAL MISSOURI.

6.0322 EVALUATION OF FLOOD PEAK PREDICTION  
METHODS IN SEMI-ARID REGIONS IN RELATION TO  
DAM SAFETY,

A.B. CUNNINGHAM

UNIV. OF NORTH CAROLINA  
SCHOOL OF AGRICULTURE

6.0137 USE OF MULTISPECTRAL PHOTOGRAPHY IN  
WATER RESOURCE PLANNING AND MANAGEMENT  
IN NORTH CAROLINA,

C.W. WELBY

UNIV. OF NORTH CAROLINA  
SCHOOL OF ARTS

6.0341 EROSION AND DEPOSITION IN THE SOUNDS  
AND ESTUARIES OF THE NORTH CAROLINA COAST,

R.L. INGRAM

UNIV. OF PITTSBURGH  
GRADUATE SCHOOL

6.0359 ALTERNATIVE ADJUSTMENTS TO NATURAL  
HAZARDS,

D.G. AREY

UNIV. OF TEXAS  
CTR. RES. IN WATER RESOURCES

6.0378 TECHNIQUE FOR PROJECTING ALTERNATIVE  
FUTURES FOR WATER RESOURCE PLANNING,

L.R. BEARD

UNIV. OF TEXAS  
SCHOOL OF ENGINEERING

6.0150 OPTIMAL FLOOD ROUTING USING STOCHASTIC  
DYNAMIC PROGRAMMING,

W.S. BUTCHER

UNIV. OF VERMONT  
SCHOOL OF ARTS

6.0393 SURVEY OF LAKE FLOODING FROM ERTS-1 -  
LAKE CHAMPLAIN,

A.O. LIND

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SCHOOL OF AGRICULTURE

6.0412 REMOTE SENSING FOR RESOURCE MANAGE-  
MENT AND FLOOD PLAIN DELINEATION,

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WATER RESOURCES CENTER

5.0410 WATER RESOURCES POLICY IN WISCONSIN -  
VOLUME IV - FLOOD PLAIN MANAGEMENT,

J.A. KUSLER

6.0413 THE USE OF DETAILED SOILS INFORMATION  
FOR DELINEATING AND REGULATING FLOOD  
PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERA-  
TIONS,

D.A. YANGGEN

UNKNOWN INST. OR INDIV. GRANT

6.0155 REVIEW EMERGENCY RELIEF FILES AND SUR-  
VEY THE TREND OF BRIDGE LOSSES DURING STORM  
CONDITIONS,

F. CHANG

6.0355 AN EVALUATION OF HURRICANE AGNES  
FLOODS IN COMPARISON TO BRIDGE DESIGN INFOR-  
MATION AVAILABLE FOR PENNSYLVANIA CONTEM-  
PORANEOUSLY,

B.M. REICH

6.0356 COMPARISON OF RECENTLY PUBLISHED FOR-  
MULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA,

B.M. REICH

UPPER MISS. RIV. COMP. COMM.

6.0017 UPPER MISSISSIPPI RIVER COMPREHENSIVE  
BASIN STUDY - VOLUME V, APPENDIX 10: FLOOD  
CONTROL,,

UNKNOWN

UTAH STATE UNIVERSITY  
INST. FOR SOCIAL SCIENCE RES.

6.0390 DEFINING THE ELEMENTS OF THE SOCIOLOGI-  
CAL SYSTEM RELATED TO DRAINAGE PROBLEMS OF  
URBAN AREAS,

W.H. ANDREWS

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SCHOOL OF SOCIAL SCIENCE

6.0153 MODELING THE TOTAL HYDROLOGIC-  
SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS -  
PHASE III,

W.H. ANDREWS

UTAH STATE UNIVERSITY  
UTAH CTR. FOR WTR. RESOUR. RES

6.0031 STUDIES IN CONNECTION WITH HYDROLOGIC  
AND RELATED PHYSICAL PROCESSES IN THE OLYM-  
PUS COVE AREA OF SALT LAKE COUNTY,

J.P. RILEY

6.0154 PRESENT AND POTENTIAL MULTIPLE USES OF  
CANAL SYSTEMS - PHASE I,

K. UNHANAND

VALLEY REGIONAL PLANNING AGCY.

6.0192 RECOMMENDED REGIONAL PLAN FOR  
SEWERAGE, WATER SUPPLY AND STORM DRAINAGE  
- CONNECTICUT,

UNKNOWN



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6.0013 EVALUATION OF FLOOD INSURANCE IN A DIS-  
ASTER AREA,

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6.0397 PUBLIC CHOICE AND THE DISTRIBUTION OF  
BENEFITS AND COSTS OF FLOOD PLAIN REGULA-  
TION - VIRGINIA,

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6.0396 NUMERICAL STUDIES OF UNSTEADY FLOW IN  
THE JAMES RIVER - VIRGINIA,

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6.0012 PROCEEDINGS - COMMUNITY WORKSHOP ON  
FLOOD INSURANCE,

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6.0398 FLOOD DAMAGE ABATEMENT- FEDERAL  
ASSISTANCE TO LOCAL GOVERNMENT,

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6.0399 FLOOD DAMAGE ABATEMENT STUDY FOR VIR-  
GINIA,

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W.A. WAHLER & ASSOCIATES

6.0015 ANALYSIS OF COAL REFUSE DAM FAILURE  
MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST  
VIRGINIA - VOLUME I,

*UNKNOWN*

6.0040 ANALYSIS OF COAL REFUSE DAM FAILURE  
MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST  
VIRGINIA - VOLUME II, APPENDICES,

*UNKNOWN*

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6.0402 PILOT STUDY OF FLOOD PLAIN MANAGEMENT  
- WASHINGTON,

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HAIL

BATTELLE MEMORIAL

7.0017 TRACER STUDIES IN  
RESEARCH EXPERIMENT (NTR)

COLORADO STATE U  
SCHOOL OF ENGINEERING

7.0013 EXTENDED AREA REEF  
WEATHER MODIFICATION,

NATL. CENTER FOR AT

7.0010 NATIONAL HAIL RESEAR  
PORT FOR 1973 - COLORADO,

7.0011 THE NATIONAL HAIL RES  
SUMMER 1973 SUMMARY REPO

NORTH DAKOTA STATE  
AGRICULTURAL EXPER

7.0006 WEATHER MODIFICATION  
F

PURDUE UNIVERSITY  
AGRICULTURAL EXPER

7.0004 SOYBEAN PHYSIOLOGY A

STATE DIV. OF MINES &

7.0009 URBAN GEOLOGY PLAN  
THE NATURE, MAGNITUDE, & C  
HAZARDS & RECOMMENDAT  
MITIGATION (ABBREV),

STATE WATER SUB

7.0003 A STUDY OF CROP-HAIL IN  
FOR NORTHEASTERN COLORADO  
THE DESIGN OF THE NATIONAL.

7.0008 STUDIES OF HAIL DATA IN

U.S. DEPT. OF AGRIC  
ECONOMIC & STAT. ANAL

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ECONOMIC RESEARCH SERVICE

7.0007 ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL,

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7.0002 MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE,

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ENVIRON. RESEARCH LABORATORIES

7.0012 HAIL AND LIGHTNING - COLORADO,

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NATL. WEATHER SERVICE

7.0016 THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA,

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7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING,

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SCHOOL OF LIBERAL ARTS

7.0015 DESIGN OF HAIL SUPPRESSION EXPERIMENT IN ILLINOIS,

*G.M. MORGAN*

UNIV. OF NEBRASKA  
U.S.D.A. NAT. RESOUR. EC. DIV.

7.0005 ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL,

*L. BOONE*

UNIV. OF WISCONSIN  
SCHOOL OF NATURAL SCIENCES

7.0018 STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN,

*C.E. ANDERSON*

## HURRICANES

## COAST CODE ADMINISTRATION

8.0010 REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI,  
*P. MONTJOY*

## COLORADO STATE UNIVERSITY SCHOOL OF ENGINEERING

8.0066 INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES,

*W.M. GRAY*

8.0067 STUDIES OF CUMULUS HEATING AND THE CISK MECHANISM,

*W.M. GRAY*

8.0068 HURRICANE SPAWNED TORNADOES,

*D.J. NOVLAN*

8.0069 THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION,

*D.J. SHEA*

## GULF UNIV. RES. CONSORTIUM

8.0049 THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST,

*T.W. BILHORN*

## HARVARD UNIVERSITY SCHOOL OF ARTS

8.0117 NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH,

*G.F. CARRIER*

## INST. FOR DEFENSE ANALYSIS

8.0017 NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I,

*A. SACHS*

## JOHNS HOPKINS UNIVERSITY GRADUATE SCHOOL

8.0009 ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES,

*J.R. SCHUBEL*

## LOUISIANA STATE UNIV. SYSTEMS COASTAL STUDIES INSTITUTE

8.0008 EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELEUR ISLAND CHAIN AND THE EASTERN PORTION OF THE LOWER MISSISSIPPI DELTA,

8.0020 INVESTIGATION OF HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA.

UNKNOWN

8.0128 INVESTIGATION OF SHORELINE SARGENT BEACH, TEXAS.

OCEAN DATA SYSTEMS INC.

8.0105 EXTENDING THE COMPUTERIZED TYPHOON/TROPICAL STORM PREDICTION PROGRAM (TYPHOON 72) TOWARD SEVEN DAYS.

UNKNOWN

PENN. STATE UNIVERSITY  
SCHOOL OF EARTH SCIENCES

8.0125 NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES.

R. A. ANTHERS

PRINCETON UNIVERSITY  
GRADUATE SCHOOL

8.0120 MICRO AND MESOSCALE GEOPHYSICAL FLUID DYNAMICS.

Y. KURIHARA

PURDUE UNIVERSITY  
SCHOOL OF CIVIL ENGINEERING

8.0102 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES.

T. L. PAEZ

SMITHSONIAN INSTITUTION

8.0003 EFFECTS OF TROPICAL STORM AGNES ON THE CHESAPEAKE BAY.

D. CORRELL

STATE DIV. OF MINES & GEOLOGY

8.0018 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).

J. T. ALFORD

STATE RES. & DEV. CENTER

8.0011 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV).

UNKNOWN

8.0012 GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV).

UNKNOWN

T R W INCORPORATED

8.0054 TROPICAL CYCLONE ENERGY TRANSFER.

P. DERGARABEDIAN

8.0055 TROPICAL CYCLONES.

E. F. FENDELL

U R S SYSTEMS CORPORATION

8.0056 THE EFFECTS OF HURRICANE ON INDUSTRY, PUBLIC UTILITIES, AND PUBLIC OPERATIONS.

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AIR WEATHER SERVICE

8.0029 WATER WARNINGS AND FORECASTS.

U.S. AIR FORCE  
ENVIRON. TECH. APPL. CENTER

8.0071 A SURVEY OF AVAILABILITY OF HURRICANE/TYPHOON PACKAGES AND DATA.

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COASTAL ENGINEERING RESEARCH CENTER

8.0019 CONCRETE BLOCK REVENUE BENEDECT, MARYLAND.

8.0072 STORM SURGE ON THE OPEN COAST - EXPERIMENTALS AND SIMPLIFIED PREDICTIONS

8.0073 LONG-PERIOD WAVES AND SURGES

U.S. ARMY  
ENGINEER DISTRICT

8.0025 BAL. HARBOUR, FLORIDA PARK RESTORATION, BEACH EROSION CONTROL, HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA.

8.0028 JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION

8.0030 GRAND ISLE, LOUISIANA, AND VICTIMS OF HURRICANE PROTECTION ASSOCIATED WITH THE FUTURE, BAYOU LAFOURCHE - LOUISIANA

8.0031 NEW ORLEANS TO VENICE, LOUISIANA - HURRICANE PROTECTION.

8.0032 LAKE PONTCHARTRAIN, LOUISIANA - VICINITY - HURRICANE PROTECTION PROJECT

8.0033 MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA).

8.0050 VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION,

UNKNOWN

U.S. ARMY  
ESTUARIES DIVISION

8.0013 TEXAS COAST HURRICANE SURGE MODEL STUDIES,

N.J. BROGDON

U.S. ARMY  
NEW ENGLAND DIVISION

8.0034 HURRICANE PROTECTION PROJECT, STRATFORD, CONNECTICUT,

UNKNOWN

8.0035 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS,

UNKNOWN

8.0036 OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS,

UNKNOWN

8.0037 NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT,

UNKNOWN

U.S. ARMY  
WATERWAYS EXPERIMENT STATION

8.0014 SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969,

M.E. CRISWELL

8.0038 GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV),

W.H. BOBB

8.0039 GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV),

W.H. BOBB

8.0040 GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION,

N.J. BROGDON

8.0041 WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION,

C.E. CHATHAM

8.0042 WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION,

E.P. FORTSON

8.0043 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS,

SETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION,

G.A. PICKERING

8.0045 GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV),

R.A. SAGER

8.0046 GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV),

R.A. SAGER

8.0047 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES,

H.B. SIMMONS

8.0048 EFFECTS ON LAKE PONTCHARTRAIN, LA., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL,

J.C. TALLANT

8.0119 JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK,

T.C. HILL

U.S. COASTAL BEND REG. COMM.

8.0015 HURRICANE CELIA REDEVELOPMENT,

UNKNOWN

U.S. DEPT. OF COMMERCE  
BUILDING RESEARCH DIV.

8.0074 HURRICANE CAMILLE - AUGUST 1969,

R.D. DIKKERS

U.S. DEPT. OF COMMERCE  
CENTER FOR BUILDING TECHNOLOGY

8.0077 DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS,

W.F. REPS

U.S. DEPT. OF COMMERCE  
ENVIRON. RESEARCH LABORATORIES

8.0057 HURRICANE MODIFICATION,

R.C. GENTRY

8.0058 TROPICAL METEOROLOGIC PROBLEMS,

R.C. GENTRY

8.0060 STORM SURGE RESEARCH,

F. OSTAPOFF

8.0061 HURRICANE RESEARCH MODELING,

S.L. ROSENTHAL

8.0062 HURRICANE MODELING,

S.L. ROSENTHAL

8.0063 HURRICANE-TYPHOON DYNAMICS,

M. SCHERER

8.0064 HURRICANE-OCEAN INTERACTION,

U.S. DEPT. OF COMMERCE  
NATIONAL WEATHER SERVICE

- 8.0112 JOINT PROBABILITY METHOD OF TIDE  
FREQUENCY ANALYSIS APPLIED TO ATLANTIC CITY  
AND LONG BEACH ISLAND, NEW JERSEY,  
*P.A. MYERS*

U.S. DEPT. OF COMMERCE  
NATL. BUREAU OF STANDARDS

- 8.0076 HURRICANE EFFECTS ON PORT FACILITIES,  
*R.D. MARSHALL*  
8.0078 WIND AND SURGE DAMAGE DUE TO HUR-  
RICANE CAMILLE,  
*H.C. THOM*

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NATL. CLIMATIC CENTER

- 8.0122 ATLANTIC TROPICAL CYCLONE STRIKE  
PROBABILITIES (FOR SELECTED STATIONS AND THE  
MONTH OF SEPTEMBER),  
*H.L. CRUTCHER*  
8.0123 PRELIMINARY CLIMATIC DATA REPORT HUR-  
RICANE AGNES JUNE 14-23, 1972,  
*R.M. DEANGELIS*

U.S. DEPT. OF COMMERCE  
NATL. ENVIRON. SATELLITE SERV.

- 8.0075 A TECHNIQUE FOR THE ANALYSIS AND  
FORECASTING OF TROPICAL CYCLONE INTENSITIES  
FROM SATELLITE PICTURES,  
*V.F. DVORAK*

U.S. DEPT. OF COMMERCE  
NATL. HURRICANE CENTER

- 8.0084 ATLANTIC TROPICAL SYSTEMS OF 1972,  
*N.L. FRANK*  
8.0087 OBJECTIVE ANALYSIS OF SEA SURFACE TEM-  
PERATURES (SST),  
*B.R. JARVINEN*  
8.0088 CIRCULATION FEATURES OF TROPICAL  
CYCLONES,  
*B.R. JARVINEN*  
8.0089 PREDICTION OF HURRICANE DEVELOPMENT  
AND MOVEMENT WITH A BAROCLINIC MODEL,  
*B.I. MILLER*  
8.0090 GRAPHICAL DISPLAY OF HURRICANE  
FORECASTS,  
*C.J. NAUMANN*  
8.0091 STATISTICAL-DYNAMICAL PREDICTION OF  
HURRICANE TRACKS,  
*C.J. NEUMANN*  
8.0092 ERROR ANALYSIS OF HURRICANE FORECASTS,  
*J.M. PELISSIER*  
8.0093 BAROTROPIC PREDICTION OF HURRICANE  
TRACKS,  
*A.C. PIKE*

U.S. DEPT. OF COMMERCE  
NATL. HURRICANE RES. LA

- 8.0085 HURRICANE DEBBIE MODIFICA-  
MENTS, AUGUST 1969,  
8.0095 PROJECT STORMFURY ANNUAL  
  
U.S. DEPT. OF COMMERCE  
NATL. OCEANIC & ATMOS. AD  
8.0004 FEDERAL PLAN FOR METEOROL-  
OGICAL SERVICES & SUPPORTING RESEARCH  
1974,  
8.0020 NATIONAL HURRICANE OPERATI-  
ONAL PLAN,  
8.0021 NATIONAL HURRICANE OPERA-  
TIONAL PLAN, 1974,  
8.0022 FINAL REPORT OF THE DISAS-  
TER TEAM ON THE EVENTS OF AGNES,  
8.0023 THE HOMEPORT STORY - AN IM-  
AGINE READY FOR A HURRICANE,  
8.0106 BENEFITS OF ENVIRONMENTAL  
ACTION IN THE EASTERN GULF OF MEXICO,  
8.0107 HURRICANE MODIFICATION RES-  
ULTS OF PROJECT STORMFURY,

U.S. DEPT. OF COMMERCE  
NATL. WEATHER SERVICE

- 8.0005 ATLANTIC HURRICANE SEASON  
8.0016 MEMORABLE HURRICANES OF  
THE UNITED STATES SINCE 1973,  
8.0086 COMPUTER METHODS APPLIED  
TO THE ANALYSIS OF TROPICAL STORM AND HUR-  
RICANE METEOROLOGY,  
8.0097 GIANT WAVES HIT HAWAII,  
8.0127 SOUTH CAROLINA HURRICANE  
DESCRIPTIVE LISTING OF TROPICAL STORMS  
THAT HAVE AFFECTED SOUTH CAROLINA,  
8.0129 OBJECTIVE ANALYSIS OF THE  
TEMPERATURE,  
8.0130 A DECISION PROCEDURE FOR AD-  
JUSTING THE LANDFALL OF HURRICANES,  
8.0131 THE DECISION PROCESS IN  
HURRICANE FORECASTING,

U.S. DEPT. OF COMMERCE  
OFF. OF HYDROLOGY

8.0108 VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF THE GOES SATELLITE.

A.F. FLANDERS

U.S. DEPT. OF COMMERCE  
TECHNIQUES DEVELOPMENT LAB.

8.0109 TROPICAL STORM SURGE FORECASTING,

C.P. JELESNIANSKI

8.0110 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - 1. LANDFALL STORMS,

C.P. JELESNIANSKI

8.0111 SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS,

C.P. JELESNIANSKI

8.0113 MARINE ENVIRONMENTAL PREDICTION,

N.A. PORE

8.0114 SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS,

N.A. PORE

8.0115 MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972,

N.A. PORE

8.0116 FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES,

N.A. PORE

U.S. DEPT. OF COMMERCE  
WEATHER MODIFICATION PRG. OFF.

8.0059 A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS,

C.P. JELESNIANSKI

U.S. DEPT. OF HOU. & URB. DEV.  
FED. INSURANCE ADMINISTRATION

8.0079 REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965,

UNKNOWN

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

8.0027 ESTUARINE HYDROLOGY OF TAMPA BAY,

C.R. GOODWIN

U.S. EXEC. OFFICE OF THE PRES.  
OFF. OF EMERGENCY PREPAREDNESS

8.0001 THE FEDERAL RESPONSE TO TROPICAL STORM AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF,

UNKNOWN

U.S. NATL. AERO. & SPACE ADM.  
GODDARD SPACE FLIGHT CENTER

8.0104 MICROWAVE METEOROLOGY,

J.L. KING

U.S. NATL. AERO. & SPACE ADM.  
JOHN F. KENNEDY SPACE CENTER

8.0083 HURRICANE PREPAREDNESS AND CONTROL PLAN,

UNKNOWN

U.S. NAVY  
ENVIRON. PRED. RES. FACILITY

8.0053 TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES,

R.W. FETT

U.S. NAVY  
POSTGRADUATE SCHOOL

8.0052 FURTHER VERIFICATIONS OF AND EXPERIMENTS TO IMPROVE THE MODIFIED HATRACK SCHEME FOR FORECASTING THE MOTION OF TROPICAL CYCLONES,

S.G. COLGAN

U.S. NAVY  
WEATHER RESEARCH FACILITY

8.0136 STORM-SURGE FORECASTING,

J.W. NICKERSON

U.S. NAVY  
WEATHER SERVICE COMMAND

8.0080 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME I - 24 HOUR MOVEMENT,

H.L. CRUTCHER

8.0081 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT,

H.L. CRUTCHER

8.0082 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT,

H.L. CRUTCHER

UNIV. OF CALIFORNIA  
SCHOOL OF ENGINEERING

# HURRICANES

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*T.T. FUJITA*

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*F.J. SWAYE*

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*C.Y. YANG*

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*A.J. MEHTA*

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*T. MURAKAMI*

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*T. MURAKAMI*

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*Y.K. WEN*

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*L.G. ANDERSON*

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## UNIV. OF RHODE ISLAND SCHOOL OF ENGINEERING

- 8.0126 ANALYTICAL PHYSICAL MODEL.

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- 8.0137 ENERGY, MASS AND ANGULAR BUDGETS OF EXTRATROPICAL CYCLONES,  
*D.*

## UNIV. OF WISCONSIN SCHOOL OF LETTERS

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## UNKNOWN INST. OR INDIV. GRA

- 8.0007 THE NATURE AND EXTENT OF STORM DAMAGE CAUSED BY HURRICANE CAMILLE.

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- 8.0135 OPERATION AGNES.

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- 8.0118 PROFILE OF A STORM - WIND, CLIMATE, EROSION ON THE SOUTHEASTERN SHORE OF MICHIGAN.

## LAND SLIDES

## CALIF. INST. OF TECHNOLOGY GRADUATE SCHOOL

- 9.0004 GENERAL REVIEW OF THE SEISMICITY TO SELECTED U.S. NAVY INSTALLATIONS.

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## GLENORA CITY GOVERNMENT

ENGINEERING GEOLOGIC REPORT OF  
GENERAL PLAN STUDY FOR THE CITY OF GLEN-  
ORA, CALIFORNIA,

F.B. LEIGHTON

## HAMEL GEOTECHNICAL CONSULTANTS

ROCK STRENGTH FROM FAILURE CASES -  
HOUSE SLOPE STABILITY STUDY, FORT PECK  
MONTANA,

J.V. HAMEL

OHIO STATE UNIVERSITY  
SCHOOL OF AGRICULTURE

LANDSLIPS IN SOUTHEASTERN OHIO,

K.R. EVERETT

STABILIZATION OF STEEP LAND SLOPES -

G.O. SCHWAB

OHIO STATE UNIVERSITY  
SCHOOL OF ENGINEERING

DEVELOPING REMOTE SENSING TECHNIQUES  
FOR PREDICTION OF LANDSLIDES,

O.W. MINTZER

ENVIRONMENTAL INFLUENCES ON STABILITY  
OF MASSSES - ALASKA AND OHIO,

T.H. WU

OREGON STATE UNIVERSITY  
SCHOOL OF ENGINEERING

FLOW SLIDE CONTROL WITH SLOPE REVET-  
MENTS,

W.L. SCHROEDER

STANFORD UNIVERSITY  
SCHOOL OF EARTH SCIENCES

MOBILIZATION OF DEBRIS FLOWS 9973-EN,

A.M. JOHNSON

## STATE BUR. OF HIGHWAYS

LANDSLIDES - KENTUCKY,

C.T. GORMAN

## STATE DIV. OF HIGHWAYS

9.0005 EARTHWORK REINFORCEMENT TECHNIQUES -  
LOS ANGELES AREA,

R.A. FORSYTH

9.0006 SUBAUDIBLE ROCK NOISE (SARN) AS A MEA-  
SURE OF SLOPE STABILITY, CALIFORNIA,

R. MEARNS

9.0037 LIME SOIL STABILIZATION STUDY,

R.A. FORSYTH

9.0038 EVALUATION OF 'ION EXCHANGE' LANDSLIDE  
CORRECTION TECHNIQUE - CALIFORNIA,

T.W. SMITH

## STATE DIV. OF MINES &amp; GEOLOGY

9.0007 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV),

J.T. ALFORE

## STATE DIV. OF RES.

9.0014 INVESTIGATION OF LANDSLIDES ON  
HIGHWAYS,

J.H. HAVENS

## STATE GEOL. SURVEY

9.0011 ENGINEERING GEOLOGY - ILLINOIS,

W.C. SMITH

9.0022 LANDSLIDE STUDIES IN SOUTH DAKOTA - RE-  
PORT NO.1 - LOCATION OF AREAS WITH HIGH  
LANDSLIDE POTENTIAL IN THE PIERRE SHALE,

J. SCULLY

9.0053 ACKER LAKE LANDSLIDE, MONROE COUNTY,  
MISSISSIPPI,

D.M. KEADY

## STATE HIGHWAY COMMISSION

9.0013 WATER DRAINAGE FROM IN-PLACE FILLS TO  
PREVENT OR HALT FILL,

P.C. CLARK

## STATE HIGHWAY DEPARTMENT

9.0018 INVESTIGATION OF RED RIVER VALLEY  
GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND  
PERFORMANCE,

D.K. LEER



9.0039 EVALUATION OF THE ION EXCHANGE LAND-  
SLIDE CORRECTION TECHNIQUE,

R. MEARNS

TRANSPORTATION RES. BOARD

9.0010 SHEAR STRENGTH OF FINE-GRAINED SOILS -  
WEST POINT, NEW YORK.

UNKNOWN

U.S. ARMY  
MISSOURI RIVER ENGR. DIV.

9.0054 ROCK STRENGTH FROM FAILURE CASES.

J.F. REDLINGER

U.S. DEPT. OF AGRICULTURE  
PAC. N.W. FOR. & RG. EXP. STA.

9.0024 MECHANICS OF DEBRIS AVALANCHING IN  
SHALLOW TILL SOILS OF SOUTHEAST ALASKA,

D.N. SWANSTON

9.0062 EROSION AND SEDIMENTATION FOLLOWING  
ROAD CONSTRUCTION AND TIMBER HARVEST  
UNSTABLE SOILS IN THREE SMALL WESTERN  
OREGON WATERSHEDS,

R.L. FREDRIKSEN

U.S. DEPT. OF THE INTERIOR  
BUREAU OF MINES

9.0009 LOCATION OF SLOPE FAILURE PLANES.

R.H. MERRILL

U.S. DEPT. OF THE INTERIOR  
BUREAU OF RECLAMATION

9.0008 RIPRAP SLOPE PROTECTION FOR EARTH DAMS  
- A REVIEW OF PRACTICES AND PROCEDURES,

F.J. DAVIS

9.0047 EVALUATION OF CRITERIA FOR LANDSLIDE  
ANALYSIS AS PRESENTED IN THE U.S.G.S.,

UNKNOWN

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

9.0001 REGIONAL GEOLOGIC FRAMEWORK - SAN AN-  
DREAS FAULT - CALIFORNIA,

T.W. DIBBLEE

9.0002 REGIONAL SLOPE STABILITY STUDIES -  
CALIFORNIA AND PENNSYLVANIA,

D.H. RADBRUCHHALL

9.0027 SANTA CRUZ COUNTY COOP,

E.E. BRABB

9.0028 EARTHQUAKE HAZARD REDUCTION, SAN  
FRANCISCO BAY REGION,

E.E. BRABB

9.0029 GEOLOGY OF THE POINT DUME QUADRANGLE  
AND THE LOS ANGELES COUNTY PART OF THE  
TRIUNFO PASS QUADRANGLE, LOS ANGELES CO.  
COOPERATIVE CALIFORNIA

9.0031 ALASKA GEOLOGIC EARTHQUAKE

9.0032 GEOLOGY OF THE POINT BONITO  
GLE, CALIFORNIA.

9.0033 ACTIVE FAULTS AND GEOLOGIC  
MUGU TO WILMINGTON, CALIFORNIA,

9.0034 MALIBU BEACH QUADRANGLE AND  
CORPORATED PART OF THE TOPANGA  
GLE, LOS ANGELES COUNTY  
CALIFORNIA,

9.0040 SOCORRO 2 DEGREE QUADRANGLE  
MEXICO,

9.0041 GEOLOGY OF THE RAPID CITY  
DAKOTA,

J.M.

9.0042 DENVER METROPOLITAN AREA, COLO-  
RADO,

9.0043 SURFICIAL GEOLOGY OF JUNEAU  
TY URBAN AREA, ALASKA,

9.0044 DENVER-FRONT RANGE URBAN C

9.0045 MOUNTAIN SOILS, FRONT RANGE  
RIDOR,

9.0046 SNAKE RIVER BASIN, PART F  
PART, NORTHWEST MARGIN - IDAHO,

9.0048 HAMILTON 2 DEGREE,

9.0049 PROGRAM DESIGN-1971 - SAN FRANCISCO  
REGION ENVIRONMENT AND RESOURCE  
STUDY,

U.S. NATL. AERO. & SPACE ADMINISTRATION  
AMES RESEARCH CENTER

9.0035 REMOTE SENSING FOR GEOLOGIC  
AND DISASTERS, MINE AREA CONSERVATION  
MAPPING AND LAND USE PLANNING,

U.S. NATL. AERO. & SPACE ADMINISTRATION  
HEADQUARTERS

9.0050 REMOTE SENSING APPLICATIONS  
HYDROLOGY AND GEOLOGY,

UNIV. OF CALIFORNIA  
SCHOOL OF ENGINEERING

9.0025 COLLABORATIVE RESEARCH ON  
SLOPE PROTECTION FOR EARTHQUAKE

UNIV. OF CALIFORNIA  
SCHOOL OF PHYSICAL SCIENCES

9.0036 DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA,

*D.H. POOLE*

UNIV. OF ILLINOIS  
SCHOOL OF ENGINEERING

9.0012 STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS,

*G. MESRI*

UNIV. OF MICHIGAN  
SCHOOL OF ENGINEERING

9.0051 EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON,

*D.H. GRAY*

9.0052 EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES,

*D.H. GRAY*

UNIV. OF NEBRASKA  
SCHOOL OF ARTS

9.0055 TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH,

*J.F. SHRODER*

UNIV. OF TEXAS  
CTR. FOR HIGHWAY RESEARCH

9.0023 A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS,

*T.G. ABRAMS*

LAND SUBSIDENCE

AGRIC. RES. & EDUC. CENTER

10.0028 SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS,

*B.G. VOLK*

ARCTIC INST. OF NORTH AMERICA

10.0025 STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I,

*R.I. LEWELLEN*

CALIF. INST. OF TECHNOLOGY

LAMAR UNIVERSITY  
SCHOOL OF ENGINEERING

10.0032 CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA,

*A.P. DELFLACHIE*

MISSISSIPPI ST. UNIVERSITY  
SCHOOL OF ARTS

10.0008 STATUS OF LAND SUBSIDENCE DUE TO GROUND-WATER WITHDRAWAL IN MISSISSIPPI,

*D.M. KEADY*

NATI. ACAD. OF SCIENCES

10.0026 RETURNING UNDERGROUND COAL MINE WASTES TO MINED-OUT VOIDS,

*R.A. CARPENTER*

STATE DEPT. OF TRANSPORTATION

10.0031 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO,

*W.F. NORELL*

STATE DIV. OF MINES & GEOLOGY

10.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV),

*J.T. ALFORE*

STATE HIGHWAY DEPARTMENT

10.0014 ARIZONA EARTH FISSURE INVESTIGATION,

*C. WINIKKA*

TEXAS A & M UNIVERSITY SYSTEM  
SCHOOL OF AGRICULTURE

10.0001 COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS,

*W.L. TROCK*

U.S. ARMY  
WATERWAYS EXPERIMENT STATION

10.0009 DETECTION OF SUBSURFACE OPENINGS - INDIANA, MISSOURI,

*E.R. BATES*

10.0010 STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS,

*J.G. JACKSON*

U.S. DEPT. OF THE INTERIOR  
BUREAU OF MINES

10.0005 DEVELOP METHODS FOR PREDICTING THE  
COMPONENTS OF GROUND MOVEMENT ABOVE  
MINE WORKINGS.

D.Q. FLETCHER

10.0006 MICROSEISMIC DETERMINATION OF COAL  
MINE ENTRY STABILITY.

R.D. MUNSON

10.0022 DEVELOP DESIGN CRITERIA FOR MINING  
SALT-DOME DEPOSITS TO MINIMIZE SURFACE SUB-  
SIDENCE.

T.A. MORGAN

10.0023 ESTABLISH TECHNIQUES FOR MONITORING  
SURFACE SUBSIDENCE OVER MINED AREAS.

W.J. TESCH

10.0024 MEASUREMENT AND EVALUATION OF SUB-  
SIDENCE OVER A COAL MINE WITH VARYING OVER-  
BURDEN THICKNESS.

W.N. YOUNGS

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

10.0004 COAL MINE DEFORMATION STUDIES, SOMER-  
SET, COLORADO.

C.R. DUNRUD

10.0011 LAND-SURFACE SUBSIDENCE, BAYTOWN  
AREA, TEXAS.

R.K. GABRYSCH

10.0012 LAND-SURFACE SUBSIDENCE, TEXAS CITY  
AND SEABROOK AREAS, TEXAS.

R.K. GABRYSCH

10.0013 CONTINUING QUANTITATIVE GROUND-  
WATER STUDIES IN THE HOUSTON DISTRICT.

A.G. WINSLOW

10.0015 MASS PROPERTIES OF OIL FIELD ROCKS -  
CALIFORNIA.

L.A. REYER

10.0016 ALASKA GEOLOGIC EARTHQUAKE HAZARDS.

G. PLAFKER

10.0017 SUBSIDENCE AND RELATED ASPECTS OF  
GEOTHERMAL SYSTEMS.

B.E. LOFGREN

10.0018 LAND-SUBSIDENCE STUDIES IN CALIFORNIA -  
TO STUDY THE EXTENT, MAGNITUDE R.

J.F. POLAND

10.0019 LAND SUBSIDENCE STUDIES IN THE SAN  
JOAQUIN VALLEY - CALIFORNIA.

J.F. POLAND

10.0020 DENVER URBAN CORRIDOR STUDIES -  
COLORADO.

W.R. HANSEN

10.0021 ENGINEERING GEOLOGY RECONNAISSANCE  
STUDIES OF COASTAL COMMUNITIES, ALASKA.

R.W. LEMKE

10.0027 EARLY DETECTION AND CORRECTION OF  
SINKHOLE PROBLEMS - ALABAMA.

J.G. NEWTON

UNIV. OF KENTUCKY  
SCHOOL OF ENGINEERING

10.0007 ROCK MECHANICS STUDY OF SHO-  
MINING - KENTUCKY.

F.D.

UNKNOWN INST. OR INDIV. GRANT

10.0033 DEMONSTRATION OF A TECHNIQ  
LIMITING THE SUBSIDENCE OF LAND OVE  
DONED MINES ROCK SPRINGS, WYOMING.

U.

SNOWSTORMS

M B ASSOCIATES

11.0002 SNOW AND ICE DETECTION AND V  
SYSTEMS.

A.I.

ROCKY MTN. FOREST & RANGE STA

11.0008 DETERMINATION OF SNOW FENCE  
CRITERIA, AND DEVELOPMENT OF A HA  
FOR SNOW CONTROL.

R.D.

STATE DIV. OF MINES & GEOLOGY

11.0001 URBAN GEOLOGY PLAN FOR CALI  
THE NATURE, MAGNITUDE, & COSTS OF C  
HAZARDS & RECOMMENDATIONS FOR  
MITIGATION (ABBREV).

J.T.

U.S. DEPT. OF COMMERCE  
ATMOSPHERIC PHYS. & CHEM. LAB

11.0003 THE MODIFICATION OF GREAT  
WINTER STORMS.

H.K. WE

U.S. DEPT. OF COMMERCE  
NATL. OCEANIC & ATMOS. ADMIN.

11.0004 NATIONAL EAST COAST WINTER  
OPERATIONS PLAN.

U.

U.S. DEPT. OF COMMERCE  
NATL. WEATHER SERVICE

11.0005 SNOW FORECASTING FOR SOUTH  
WISCONSIN.

R.

11.0006 A SYNOPTIC CLIMATOLOGY  
SNOWSTORMS IN NORTHWESTERN NEVADA.

B.I.

U.S. DEPT. OF COMMERCE  
WEATHER BUREAU

SCHOOL OF ARTS  
7 PHYSICAL EVALUATION OF CLOUD SEEDING  
TECHNIQUES FOR MODIFYING OROGRAPHIC SNOW-  
FALL - THE CASCADE PROJECT,

P.V. HOBBS

## TORNADOES

### COLORADO STATE UNIVERSITY SCHOOL OF ENGINEERING

HURRICANE SPAWNED TORNADOES,

D.J. NOVLAN

### MASS. INST. OF TECHNOLOGY SCHOOL OF ENGINEERING

WIND-INDUCED MOTION AND HUMAN  
COMFORT IN TALL BUILDINGS,

J.W. REED

STATE DIV. OF MINES & GEOLOGY  
URBAN GEOLOGY PLAN FOR CALIFORNIA -  
NATURE, MAGNITUDE, & COSTS OF GEOLOGIC  
HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV),

J.T. ALFORE

### STATE WATER SURVEY

DENSE RAIN GAGE NETWORK PROJECTS - IL-  
LINOIS,

S.A. CHANGNON

STUDY OF URBAN EFFECTS ON PRECIPITA-  
TION AND SEVERE WEATHER AT ST. LOUIS - IL-  
LINOIS,

S.A. CHANGNON

HYDROMETEOROLOGICAL ANALYSIS OF  
TROPICAL RAINSTORMS - ILLINOIS,

F.A. HUFF

STUDY OF THE SYNOPTIC CLIMATOLOGY OF  
TORNADOES IN AMERICA,

G. MORGAN

### TETRA TECH INCORPORATED

COMPUTER SIMULATION OF SEVERE STORM  
PRECIPITATIONS WITH DOPPLER RADARS,

UNKNOWN

### TEXAS TECHNOLOGICAL UNIVERSITY SCHOOL OF ARTS

TORNADO - THE VOICE OF THE PEOPLE IN  
THE PAST AND AFTER - A STUDY IN RESIDENTIAL  
DEVELOPMENT - TEXAS (LUBBOCK?)

12.0040 IMPACT OF THE LUBBOCK STORM ON RE-  
GIONAL SYSTEMS - TEXAS,

J.E. MINOR

### U.S. AIR FORCE AIR WEATHER SERVICE

12.0016 WATER WARNINGS AND SPECIALIZED  
FORECASTS,

UNKNOWN

12.0029 FORECASTING GUSTY SURFACE WINDS IN  
THE CONTINENTAL UNITED STATES,

A.W. WATERS

### U.S. AIR FORCE ENVIRON. TECH. APPL. CENTER

12.0003 THE OCHELTREE TORNADO - A CASE STUDY -  
MISSOURI,

W.E. FINLEY

### U.S. ATOMIC ENERGY COMMISSION LOS ALAMOS SCIENTIFIC LAB.

12.0019 NUMERICAL ANALYSIS OF TORNADO WIND  
LOADS ON BUILDINGS - TEXAS,

R.A. GENTRY

### U.S. DEPT. OF COMMERCE BUILDING RESEARCH DIV.

12.0004 LUBBOCK TORNADO - A SURVEY OF BUILD-  
ING DAMAGE IN AN URBAN AREA - TEXAS,

N.F. SOMES

### U.S. DEPT. OF COMMERCE ENVIRON. RESEARCH LABORATORIES

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S.L. BARNES

12.0024 PAPERS ON OKLAHOMA THUNDERSTORMS,  
APRIL 29-30, 1970,

S.L. BARNES

12.0025 LIFE CYCLE OF FLORIDA KEYS' WATER-  
SPOUTS,

J.H. GOLDEN

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W. TAYLOR

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C.G. CULVER

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12.0005 FEDERAL PLAN FOR METEOROLOGICAL SER-  
VICES & SUPPORTING RESEARCH - FISCAL YEAR  
1974,

12.0012 NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN,

R.E. HALLGREN

12.0013 NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN,

UNKNOWN

12.0014 NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN - 1974,

UNKNOWN

12.0015 MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971 - A REPORT TO THE ADMINISTRATOR,

UNKNOWN

12.0026 DOPPLER RADAR METHODOLOGY FOR THE OBSERVATION OF CONVECTIVE STORMS,

R.M. LHERMITTE

U.S. DEPT. OF COMMERCE  
NATL. SEVERE STORMS LAB.

12.0007 MORPHOLOGY OF TWO TORNADIC STORMS - AN ANALYSIS OF NSSL DATA ON APRIL 30, 1970 - OKLAHOMA CITY, OKLAHOMA,

S.L. BARNES

12.0008 TORNADO INCIDENCE MAPS,

A. COURT

12.0021 TORNADOES,

E. KESSLER

12.0022 OBSERVATIONS OF SEVERE STORMS ON 26 AND 28 APRIL 1971,

C.L. VLCEK

12.0038 BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967,

K.C. CRAWFORD

12.0039 SOME STATISTICAL ASPECTS OF WATER-SPOUT FORMATION - FLORIDA,

J.H. GOLDEN

U.S. DEPT. OF COMMERCE  
NATL. WEATHER SERVICE

12.0009 TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880-1970),

J.V. VAIKSNORAS

12.0010 ARIZONA 'EDDY' TORNADOES,

R.S. INGRAM

12.0036 DUST DEVIL METEOROLOGY,

J.R. COOLEY

12.0037 DAILY TORNADO FREQUENCIES FOR THE CONTIGUOUS UNITED STATES,

H. GORDON

U.S. DEPT. OF COMMERCE  
WEATHER BUREAU

12.0020 SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUNDERSTORM AND TORNADO WATCHES WITHIN

UNIV. OF CHICAGO  
SCHOOL OF PHYSICAL SCIENCES

12.0030 ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON,

T.T.

12.0031 PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY,

T.T.

UNIV. OF ILLINOIS  
SCHOOL OF ENGINEERING

12.0035 PROBABILISTIC MODELING OF EXCEEDANCE LOADS,

XENIA COMMISSION

12.0006 XENIA REBUILDS,

UN

TSUNAMIS

CALIF. INST. OF TECHNOLOGY  
GRADUATE SCHOOL

13.0002 GENERAL REVIEW OF THE SEISMICITY OF SELECTED U.S. NAVY INSTALLATIONS,

LEHIGH UNIVERSITY  
CTR. FOR THE APPL. OF MATH.

13.0029 THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING GEOMETRY - OFF-SHORE BEHAVIOR,

E

STATE DIV. OF MINES & GEOLOGY

13.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR MITIGATION (ABBREV),

J.T.

TETRA TECH INCORPORATED

13.0015 TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS,

U.S. ARMY  
COASTAL ENGIN. RES. CENTER

U.S. ARMY  
WATERWAYS EXPERIMENT STATION

13.0009 STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION.

A.M. KAMEL

13.0010 STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION.

N.R. OSWALT

13.0026 THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL.

G.H. KEULEGAN

13.0027 A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL.

G.H. KEULEGAN

13.0028 TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY.

R.W. WHALIN

U.S. DEPT. OF COMMERCE  
ENVIRON. RESEARCH LABORATORIES

13.0004 TSUNAMI RESEARCH,

S.T. ALGERMISSEN

13.0005 TSUNAMI RESEARCH,

G.R. MILLER

U.S. DEPT. OF COMMERCE  
NATL. OCEAN SURVEY

13.0007 WAVE REPORTING PROCEDURES FOR TIDE OBSERVERS IN THE TSUNAMI WARNING SYSTEM,

M.G. SPAETH

13.0008 TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION,

UNKNOWN

13.0025 THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS,

UNKNOWN

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NATL. OCEANIC & ATMOS. ADMIN.

13.0020 NUMERICAL SIMULATION OF TSUNAMIS,

C.L. MADER

U.S. DEPT. OF THE INTERIOR

13.0006 TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V,

UNKNOWN

U.S. DEPT. OF THE INTERIOR

13.0013 ALASKA GEOLOGIC EARTHQUAKE HAZARDS,  
G. PLAFER

13.0014 ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA,  
H.C. WAGNER

13.0017 ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA,  
R.W. LEMKE

13.0018 RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA,  
J.T. MCGILL

UNIV. OF ALASKA  
INST. OF MARINE SCIENCES

13.0012 EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA,  
T.C. ROYER

UNIV. OF CALIFORNIA  
INST. OF GEOPHYS. & PLA. PHYS.

13.0016 NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES,

J.W. MILES

UNIV. OF CALIFORNIA  
SCHOOL OF ENGINEERING

13.0001 FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA,

C. PETRAUSKAS

UNIV. OF HAWAII  
HAWAII INST. OF GEOPHYSICS

13.0022 RELATIVE SPECTRA OF TSUNAMIS,  
G.R. MILLER

13.0023 RECENT TSUNAMI THEORY,  
R.W. PREISENDORFER

13.0024 TSUNAMI SHORELINE TRACT,  
G.P. WOOLLARD

UNIV. OF HAWAII  
SCHOOL OF ARTS

13.0021 PACIFIC TSUNAMI CATALOG,  
D.C. COX

VOLCANOES

STATE DIV. OF MINES & GEOLOGY

14.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA

HAWAII, *D.R. MULLINEAUX*  
14.0002 SATELLITE VOLCANO SURVEILLANCE -  
ALASKA, HAWAII AND WASHINGTON, *P.L. WARD*

14.0004 HAWAIIAN VOLCANO OBSERVATORY,  
*D.W. PETERSON*

14.0006 GEODIMETER STUDIES OF CASCADE VOL-  
CANOES - WASHINGTON, OREGON AND CALIFORNIA,  
*D.A. SWANSON*

14.0007 VOLCANIC HAZARDS IN THE CASCADE  
RANGE - CALIFORNIA AND WASHINGTON,  
*D.R. CRANDELL*

14.0008 THERMAL SURVEILLANCE OF VOLCANOES -  
REMOTE SENSING OF LONG VALLEY IN GEOTHER-  
MAL PROGRAM - WASHINGTON, OREGON AND  
CALIFORNIA, *J.D. FRIEDMAN*

14.0009 THERMAL SURVEILLANCE OF ACTIVE VOL-  
CANOES, *J.D. FRIEDMAN*

14.0010 VOLCANIC HAZARDS, ISLAND OF HAWAII,  
*D.R. MULLINEAUX*

14.0011 EASTERN SNAKE RIVER PLAIN REGION IN-  
VESTIGATIONS - IDAHO, *S.S. ORIEL*

14.0012 SNAKE RIVER PLAIN, PART E - NORTH CEN-  
TRAL - IDAHO, *D. SCHLEICHER*

14.0013 SNAKE RIVER PLAIN, PART B - VOLCANIC  
ROCKS - IDAHO, *P.L. WILLIAMS*

14.0014 REGIONAL VOLCANOLOGY - WESTERN  
UNITED STATES INCLUDING ALASKA AND HAWAII,  
*R.L. SMITH*

UNIV. OF ALASKA  
GEOPHYSICAL INSTITUTE

14.0005 SEISMIC SURVEILLANCE OF AUGUSTINE RE-  
DOUBT AND SPURR VOLCANOES, COOK INLET,  
ALASKA, *J. KIENLE*

UNIV. OF HAWAII  
WATER RESOURCES RESEARCH CTR.

14.0015 RAINWATER CONTAMINATION BY VOLCANIC  
VOLATILES FROM KILAUEA VOLCANO, HAWAII  
(PHASE I), *J.B. FINLAYSON*

UNIV. OF WASHINGTON  
SCHOOL OF ARTS

14.0016 SEISMIC ACTIVITY OF THE CASCADE VOL-  
CANOES, *S.W. SMITH*

15.0014 SHORT-TERM CLIMATE CHANGES  
COASTAL EROSION, BARROW, ALASKA, *J.D.*

IOWA STATE UNIVERSITY  
WATER RESOURCES RESEARCH INST.

15.0008 PLANT SPECIES AS WILDLIFE COVER  
EROSION CONTROL ON 'MUDFLOTS' IN  
LARGE RESERVOIR SYSTEMS, *J.A. H.*

NEW YORK OCEAN SCIENCE LAB.

15.0028 GROIN STUDY ON THE NORTH SHORE OF  
FOLK COUNTY, LONG ISLAND,  
YORK, BETWEEN ORIENT POINT AND PORT J  
SON HARBOR, *T. O.*

OREGON STATE UNIVERSITY  
SCHOOL OF SCIENCE

15.0033 EVALUATION OF GEOLOGIC AND OC-  
GRAPHIC FACTORS INFLUENCING EROSION OF  
OREGON COAST, *J.V.*

STATE DIV. OF GEOLOG. SURVEY

15.0030 SHORE EROSION STUDY OF ERIE CO  
OHIO, *L.L. BR.*

15.0031 SHORE EROSION STUDY OF LAKE CO  
OHIO, *L.L. BR.*

15.0032 SHORE EROSION STUDIES ALONG THE  
SHORE OF LAKE ERIE, *C.H. C.*

STATE DIV. OF MINES & GEOLOGY

15.0003 URBAN GEOLOGY PLAN FOR CALIFOR-  
THE NATURE, MAGNITUDE, & COSTS OF GEO-  
HAZARDS & RECOMMENDATIONS FOR  
MITIGATION (ABBREV), *J.T. A.*

STATE UNIVERSITY OF NEW YORK  
SCHOOL OF ARTS

15.0027 ENVIRONMENTAL GEOMORPHIC STU-  
THE COASTAL REGIMES ALONG THE SOUTH  
OF LONG ISLAND - NEW YORK, *D.R.*

STATE WATER SURVEY

15.0020 LAKE SHORE EROSION IN ILLINOIS,  
*W.J. R.*

TEXAS A & M UNIVERSITY SYSTEM  
GRADUATE SCHOOL

5.0035 PROPERTIES AND STABILITY OF A TEXAS  
BARRIER BEACH INLET,

C. MASON

5.0036 INVESTIGATION OF SHORELINE CHANGES AT  
SARGENT BEACH, TEXAS,

W.N. SEELIG

U.S. ARMY  
COASTAL ENGIN. RES. CENTER

.0004 CONCRETE BLOCK REVETMENT NEAR  
BENEDICT, MARYLAND,

J.V. HALL

.0015 COASTAL WORKS EVALUATION - CALIFOR-  
NIA, FLORIDA,

UNKNOWN

U.S. ARMY  
ENGINEER DISTRICT

0006 BAY HARBOUR, FLORIDA PARTIAL BEACH  
RESTORATION, BEACH EROSION CONTROL AND  
HURRICANE PROTECTION PROJECT, DADE COUNTY,  
FLORIDA,

UNKNOWN

0007 Jekyll ISLAND, GEORGIA, BEACH EROSION  
CONTROL AND HURRICANE PROTECTION,

UNKNOWN

0009 STATEN ISLAND BEACH EROSION CONTROL  
AND HURRICANE PROTECTION PROJECT, STATEN  
ISLAND, NEW YORK,

UNKNOWN

0010 BEACH EROSION PROJECT, DELAWARE  
COAST PROTECTION PROJECT, DELAWARE,

UNKNOWN

0011 VIRGINIA BEACH, VIRGINIA - BEACH EROSION  
CONTROL AND HURRICANE PROTECTION,

UNKNOWN

0021 NATIONAL SHORELINE STUDY - INVENTORY  
REPORT - LOWER MISSISSIPPI REGION,

UNKNOWN

U.S. ARMY  
NORTH CENTRAL DIVISION

0019 NATIONAL SHORELINE STUDY - GREAT  
LAKES REGION INVENTORY REPORT,

UNKNOWN

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PAC. N.W. FOR. & RG. EXP. STA.

U.S. DEPT. OF AGRICULTURE  
PAC. S.W. FOR. & RG. EXP. STA.

15.0002 FLOOD AND SEDIMENT REDUCTION IN STEEP  
UNSTABLE BRUSHLANDS OF THE SOUTHWEST,

R.M. RICE

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

15.0013 SAN FRANCISCO BAY,

D. MCCULLOCH

15.0023 SEA-CLIFF EROSION STUDIES, MAS-  
SACHUSETTS,

C.A. KAYE

15.0037 TEXAS BARRIER ISLANDS,

R.E. HUNTER

15.0039 SEDIMENT MOVEMENT AND HILLSLOPE  
MORPHOLOGY IN THE CENTRAL APPALACHIAN RE-  
GION - VIRGINIA,

UNKNOWN

UNIV. OF CALIFORNIA  
SCHOOL OF ENGINEERING

15.0001 COMPOSITE MATERIALS FOR OCEAN CON-  
STRUCTION,

A.S. TETELMAN

15.0012 HYDRAULIC EROSION OF SOILS,

K. ARULANANDAN

UNIV. OF FLORIDA  
SCHOOL OF ENGINEERING

15.0005 KENNEDY SPACE CENTER OCEAN BEACH  
EROSION - FLORIDA,

A.J. MEHTA

15.0016 COASTAL ENGINEERING STUDIES RELATED  
TO FLORIDA'S SHORELINE AND BEACH EROSION  
PROBLEMS,

J.A. PURPURA

UNIV. OF HAWAII  
WATER RESOURCES RESEARCH CTR.

15.0018 DEPOSITION OF HAWAIIAN WATERSHED AND  
ESTUARINE SEDIMENTS,

P. FAN

UNIV. OF MASSACHUSETTS  
COASTAL RESEARCH CENTER

15.0022 OFFSET COASTAL INLETS - FORMS OF SEDI-  
MENT ACCUMULATION IN THE BEACH ZONE0-  
ALASKA, NEW ENGLAND,

M.O. HAYES



UNIV. OF VERMONT  
STATE RESOURCES RES. CENTER

15.0038 ENVIRONMENTAL GEOLOGY OF SELECTED  
PARTS OF NORTHWESTERN VERMONT,

W.P. WAGNER

WILLIAMS COLLEGE  
GRADUATE SCHOOL

15.0024 SIMULATION MODEL FOR STORM CYCLES  
AND BEACH EROSION ON LAKE MICHIGAN,

R.A. DUTTA

15.0025 PROFILE OF A STORM - WIND, WAVES AND  
EROSION ON THE SOUTHEASTERN SHORE OF LAKE  
MICHIGAN,

W.T. FOX

MULTIPLE HAZARDS

AMER. INST. FOR RES.

16.0078 LABORATORY STUDIES OF THE EFFECTS OF  
PHYSICAL HAZARD ON SHELTER MANAGEMENT  
BEHAVIOR - PHASE I - STUDY PLAN,

F.R. ARMSTRONG

16.0079 THE INVESTIGATION OF SHELTER MANAGE-  
MENT AND CONTROL IN NATURAL DISASTER,

R.L. COLLINS

AURORA PLANNING BOARD

16.0095 COMPREHENSIVE PLAN - REPORT C, IMPE-  
MENTATION - VILLAGE OF EAST AURORA, N.Y.,  
TOWN OF AURORA, N.Y.,

UNKNOWN

BEUKERS LABORATORIES INC.

16.0015 DEVELOPMENT OF A DISTRESS ALERTING  
AND LOCATING SYSTEM (DALS) FOR SEARCH AND  
RESCUE MISSION,

UNKNOWN

CLARK UNIVERSITY  
GRADUATE SCHOOL

16.0094 COLLABORATIVE RESEARCH ON NATURAL  
HAZARDS,

R.H. KATES

16.0003 DEVELOPMENT OF TRAINING PROGRAM FOR  
EMERGENCY MEDICAL SERVICE PROGRAM AD-  
MINISTRATION,

UNKNOWN

GAUNTNEY & JONES COMM. INC.

16.0107 EXPEDIENT AM AND FM BROADCAST ANTEN-  
NAS,

D.E. PAULEY

GEOMET INCORPORATED

16.0045 SUMMARY REPORT WEATHER MODIFICA-  
TION - FISCAL YEARS 1969, 1970, 1971,

R.C. KOCH

GEORGE WASHINGTON UNIVERSITY  
PROG. OF POL. STUD. SCI. TECH.

16.0004 PROBING THE LAW AND BEYOND - A QUEST  
FOR PUBLIC PROTECTION FROM HAZARDOUS  
PRODUCT CATASTROPHES,

J.M. BROWN

GEORGIA INST. OF TECHNOLOGY  
HEALTH SYSTEMS RESEARCH CENTER

16.0006 A SIMULATION MODEL FOR EMERGENCY  
MEDICAL SYSTEMS,

H.E. SMALLEY

HUGHES AIRCRAFT COMPANY

16.0036 PLAN FOR AN IMPROVED COMMUNICATIONS  
SYSTEM SERVING THE EMERGENCY SERVICE DE-  
PARTMENTS OF THE CITY OF LOS ANGELES (AB-  
BREV),

UNKNOWN

HUMAN SCIENCES RESEARCH INC.

16.0108 AREA-WIDE DISASTER RESPONSE - CIVIL  
PREPAREDNESS AND REGIONAL COUNCILS,

R.J. MARSHAK

INTERNAT. JOINT COMMISSION

16.0040 REGULATION OF GREAT LAKES WATER  
LEVELS - A SUMMARY REPORT (1974),

UNKNOWN

16.0041 REGULATION OF GREAT LAKES WATER  
LEVELS - REPORT TO THE INTERNATIONAL

JOINT COMMISSION BY THE INTERNATIONAL GREAT  
LAKES LEVELS BOARD,

UNKNOWN

IOWA STATE UNIVERSITY  
SCHOOL OF SCIENCE16.0085 AN ANALYSIS OF OPERATING SYSTEM EFFECT-  
TIVENESS - FOCUS ON THE BEHAVIOR OF LOCAL  
COORDINATORS,

C.T. GRIFFIN

16.0086 ROLE PERFORMANCE IN THE OPERATING  
SYSTEM - CIVIL DEFENSE OPERATIONS IN DISASTER,  
C.L. MULFORD16.0087 SECURING COMMUNITY RESOURCES FOR SO-  
CIAL ACTION,

C.L. MULFORD

IOWA STATE UNIVERSITY  
WATER RESOURCES RESEARCH INST.16.0084 ECONOMIC FACTORS AFFECTING CHANGE IN  
THE INTENSITY OF FLOOD PLAIN USE,

J.R. BARNARD

## JACOBS ASSOCIATES

16.0026 DEBRIS CLEARING TIMES AFFECTING CRITI-  
CAL SURVIVAL ACTIONS,

T.N. WILLIAMSON

## LUZERNE CO. TRANSP. AUTHORITY

16.0034 DESIGN AND IMPLEMENT A TRANSIT SYSTEM  
FOLLOWING A NATURAL DISASTER,

UNKNOWN

MISSISSIPPI ST. UNIVERSITY  
SCHOOL OF ENGINEERING16.0013 COORDINATED ACCIDENT RESCUE EN-  
DEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-  
SOM) - VOLUME I - OPERATION STRUCTURE AND  
PROCEDURES,

J.E. CLARK

## NATL. ACAD. OF SCIENCES

16.0029 A NATIONWIDE PROGRAM TO DEVELOP RE-  
GIONAL EMERGENCY MEDICAL COMMUNICATIONS  
SYSTEMS,

D. MCCONNAUGHEY

16.0063 WEATHER AND CLIMATE MODIFICATION -  
PROBLEMS AND PROGRESS,

UNKNOWN

16.0064 FIELD STUDIES OF DISASTER BEHAVIOR - AN  
INVENTORY,

UNKNOWN

16.0065 TOWARD REDUCTION OF LOSSES FROM  
DISASTERSOHIO STATE UNIVERSITY  
DISASTER RESEARCH CENTER16.0017 THE SALVATION ARMY - ITS STRUCTURE,  
OPERATIONS, AND PROBLEMS IN DISASTERS,

J.L. ROSS

16.0033 COMMUNICATIONS IN NATURAL DISASTERS,  
R.A. STALLINGS16.0049 INITIAL OBSERVATIONS ON PROBLEMS AND  
DIFFICULTIES IN THE USE OF LOCAL EOC'S IN NATU-  
RAL DISASTERS,

E.L. QUARANTELLI

16.0097 THE POLICE DEPARTMENT IN NATURAL DIS-  
ASTER OPERATIONS,

J.M. BROOKS

16.0098 A PERSPECTIVE ON DISASTER PLANNING,  
R.R. DYNES16.0099 THE WARNING SYSTEM IN DISASTER SITUA-  
TIONS - A SELECTIVE ANALYSIS,

B.F. MCLUCKIE

OHIO STATE UNIVERSITY  
SCHOOL OF MEDICINE16.0016 ANALYSIS OF EMERGENCY MEDICAL SER-  
VICES COLUMBUS AND ALL FRANKLIN COUNTY  
POLITICAL SUBDIVISIONS,

R.C. CHASE

OHIO STATE UNIVERSITY  
SCHOOL OF SOCIAL SCIENCE16.0100 ORGANIZATIONAL RESPONSES TO MAJOR  
COMMUNITY CRISES,

E.L. QUARANTELLI

## SERENDIPITY INCORPORATED

16.0052 THE DEVELOPMENT OF A MEANS FOR AS-  
SESSING EMERGENCY MEDICAL RESOURCES,

J.L. COSTANZA

## STANFORD RESEARCH INSTITUTE

16.0001 EMERGENCY OPERATIONS SYSTEMS  
DEVELOPMENT - CIVIL DEFENSE RESCUE PHASE II,

L.C. THOMAS

16.0037 OPTIMUM UTILIZATION OF GOVERNMENT  
AND NON-GOVERNMENT COMMUNICATIONS  
RESOURCES,

A.W. WIEGANT

16.0053 NATURAL DISASTER OPERATIONS PLANNING,  
C.T. RAINEY

## STATE DEPT. OF COMMUNITY AFFS.

16.0093 RE-DRAFT OF SEEKONK ZONING BY LAW, 15  
NOVEMBER 1969,

J. BLACKWELL

# STATE DIV. OF MINES & GEOLOGY

16.0025 URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).

UNKNOWN

16.0038 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).

J.T. ALFORE

# STATE HIGHWAY DEPARTMENT

16.0035 NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES.

SKOG

# STATE OFF. OF THE ADJT. GEN.

16.0014 CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20).

D.G. PENTERMAN

# STATE PLANNING & GRANTS DIV.

16.0102 MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN.

UNKNOWN

# STATE PROGRAM DEV. OFFICE

16.0088 ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY.

UNKNOWN

16.0089 ZONING ORDINANCE - PAINTSVILLE, KENTUCKY.

UNKNOWN

# STATE WATER SURVEY

16.0082 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I.

F.A. HUFF

# STEPHENSON CO. PLANNING COMM.

16.0081 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS.

UNKNOWN

# SYSTEM DEVELOPMENT CORPORATION

16.0039 IMPROVED OUTDOOR ALERTING AND WARNING.

R.L. LAMOUREUX

16.0059 EMERGENCY OPERATIONS CONTINGENCY PLANNING - NEW ORLEANS, LOUISIANA.

A.I. ABERSMAN

16.0060 DEVELOPMENT OF IMPROVED EMERGENCY

# T R W INCORPORATED

16.0057 ON ESTIMATION OF MAXIMUM IN TORNADOES AND HURRICANES.

P. DEB

# TAMPA BAY REGIONAL PLAN. C

16.0080 SARASOTA - ZONING AND SUBD TROLS - REVIEW, ANALYSIS, AND RE TIONS CONCERNING CURRENT REGULA

# TEXAS A & M UNIVERSITY SYS SCHOOL OF ENGINEERING

16.0024 THE ROLE OF HELICOPTERS IN MEDICAL CARE SYSTEMS.

D

# TRI CITIES SEISMIC SAFE. STU

16.0058 THE SEISMIC SAFETY STUDY GENERAL PLAN.

D.

# U R S SYSTEMS CORPORATION

16.0027 IMPROVISING ELECTRIC POWE Duction GENERATORS DURING POWER OUTAGES.

# U.S. ARMY

# LAND WARFARE LABORATOR

16.0008 BODY RECOVERY DOG.

# U.S. ARMY

# MEDICAL RESEARCH LABORATO

16.0007 MILITARY BLOOD BANKING ASTERS).

# U.S. ARMY

# WAR COLLEGE

16.0101 DISASTER RELIEF - DOMESTIC AC SPOTLIGHT.

# U.S. DEPT. OF COMMERCE

# NATIONAL WEATHER SERVICE

16.0046 FEDERAL PLAN FOR WEATHER R

U.S. DEPT. OF COMMERCE  
NATL. BUREAU OF STANDARDS

16.0030 NATURAL DISASTERS - SOME EMPIRICAL AND  
ECONOMIC CONSIDERATIONS,

*G.T. SAV*

16.0042 EMERGENCY EQUIPMENT STANDARDS,

*A.T. HORTON*

16.0073 BUILDING PRACTICES FOR DISASTER MITIGA-  
TION,

*R.N. WRIGHT*

U.S. DEPT. OF COMMERCE  
NATL. ENVIRON. SATELLITE SERV.

16.0067 WEATHER SATELLITE CAPABILITIES  
PRESENT AND FUTURE,

*R.L. PYLE*

U.S. DEPT. OF COMMERCE  
NATL. OCEANIC & ATMOS. ADMIN.

16.0043 ESSA AND OPERATION FORESIGHT,

*UNKNOWN*

16.0068 FEDERAL PLAN FOR WEATHER RADARS,

*UNKNOWN*

16.0069 FEDERAL PLAN FOR METEOROLOGICAL SER-  
VICES & SUPPORTING RESEARCH - FISCAL YEAR  
1973,

*UNKNOWN*

16.0070 FEDERAL PLAN FOR METEOROLOGICAL SER-  
VICES & SUPPORTING RESEARCH - FISCAL YEAR  
1975,

*UNKNOWN*

16.0071 A FEDERAL PLAN FOR NATURAL DISASTER  
WARNING AND PREPAREDNESS,

*UNKNOWN*

16.0090 WEATHER MODIFICATION - FISCAL YEARS  
1969, 1970, 1971,

*UNKNOWN*

16.0091 CLIMATES OF THE STATES - CLIMATE OF  
NEW YORK,

*A.B. PACK*

U.S. DEPT. OF COMMERCE  
OFF. OF PLANS & PROGRAMS

16.0072 PLAN TO IMPROVE LOCAL WEATHER  
FORECASTS,

*UNKNOWN*

U.S. DEPT. OF DEFENSE  
DEFENSE DOCUMENTATION CENTER

16.0106 SOIL POLLUTION - EROSION EFFECTS IN SOIL.,

*UNKNOWN*

U.S. DEPT. OF HLTH. ED. & WEL.

U.S. DEPT. OF THE INTERIOR  
GEOLOGICAL SURVEY

16.0054 ENVIRONMENTAL PLANNING AND GEOLOGY  
- PROCEEDINGS OF THE SYMPOSIUM ON ENGINEER-  
ING GEOLOGY IN THE URBAN ENVIRONMENT,

*D.R. NICHOLS*

16.0055 GEOLOGIC ENVIRONMENTAL MAPS FOR  
LAND-USE PLANNING, CALIFORNIA,

*E.H. PAMPEYAN*

16.0056 SOIL ENGINEERING RESEARCH - CALIFORNIA,

*T.L. YOUNG*

16.0074 SEISMIC HAZARDS AND LAND-USE  
PLANNING,

*D.R. NICHOLS*

16.0075 PROGRAM DESIGN-1971 - SAN FRANCISCO  
BAY REGION ENVIRONMENT AND  
RESOURCES PLANNING STUDY,

*UNKNOWN*

U.S. DEPT. OF THE INTERIOR  
OFFICE OF OIL & GAS

16.0044 MINIMIZING DAMAGE TO REFINERIES FROM  
NUCLEAR ATTACK, NATURAL AND OTHER DIS-  
ASTERS,

*M.M. STEPHENS*

U.S. DEPT. OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

16.0031 EVALUATION OF EMERGENCY CALL  
SYSTEMS,

*R.H. EMERY*

U.S. DEPT. OF TRANSPORTATION  
TRANSPORTATION SYSTEMS CENTER

16.0032 NATIONAL SEARCH AND RESCUE TELECOM-  
MUNICATION SYSTEM PLAN (PINSARS),

*C. MUNDO*

U.S. EXEC. OFFICE OF THE PRES.  
OFF. OF EMERGENCY PREPAREDNESS

16.0005 THE FEDERAL RESPONSE TO TROPICAL  
STORM AGNES; A REPORT TO THE SENATE COMMIT-  
TEE ON PUBLIC WORKS, SUBCOMMITTEE ON DIS-  
ASTER RELIEF,

*UNKNOWN*

16.0077 REPORT TO THE CONGRESS - DISASTER  
PREPAREDNESS,

*UNKNOWN*

U.S. EXEC. OFFICE OF THE PRES.  
OFF. OF SCIENCE & TECHNOLOGY

16.0076 NATIONAL ATMOSPHERIC SCIENCES PRO-  
GRAM - FISCAL YEAR 1974,

*UNKNOWN*

U.S. NATL. AERO. & SPACE ADM.  
LEWIS RESEARCH CENTER

16.0047 A DIGITAL SIMULATION OF MESSAGE TRAF-  
FIC FOR NATURAL DISASTER WARNING COMMUNI-  
CATIONS SATELLITE.

G.F. HEIN

16.0048 DISASTER WARNING SATELLITE STUDY.

UNKNOWN

U.S. NAVY  
AIR TEST CENTER

16.0010 SEARCH AND RESCUE COMMUNICATION--  
GLOBAL RESCUE ALARM NET (GRAN).

W.R. CRAWFORD

UNIV. OF COLORADO  
GRADUATE SCHOOL

16.0061 A COMPARATIVE ANALYSIS OF PUBLIC SUP-  
PORT OF AND RESISTANCE TO WEATHER MODIFICA-  
TION PROJECTS.

J.E. HAAS

UNIV. OF COLORADO  
SCHOOL OF ARTS

16.0028 ASSESSMENT OF RESEARCH ON NATURAL  
HAZARDS.

E. HAAS

UNIV. OF DENVER  
GRADUATE SCHOOL

16.0062 UNIVERSITY-INDUSTRY WORKSHOP ON  
HAZARDS AND DAMAGE RELATED TO EXPANSIVE  
EARTH MATERIALS.

D. RICHARD

UNIV. OF PENNSYLVANIA  
SCHOOL OF COMMERCE

16.0019 RECOVERY FROM NATURAL DISASTERS - IN-  
SURANCE OR FEDERAL AID.

UNKNOWN

UNIV. OF PENNSYLVANIA  
SCHOOL OF MEDICINE

16.0018 SYSTEMS ANALYSIS OF EMERGENCY CARE  
DELIVERY.

W.F. HAMILTON

UNIV. OF TENNESSEE  
AGRICULTURAL EXPERIMENT STA.

16.0021 MANAGEMENT OF INSURABLE RISK.

M.B. BADENHOP

UNIV. OF TENNESSEE  
SCHOOL OF LIBERAL ARTS

16.0022 EVALUATION OF POLICY-RE-  
SEARCH IN THE FIELD OF MUN-  
SYSTEMS, OPERATIONS, AND SERVICES -- EM-  
CY MEDICAL SERVICES.

H.

UNIV. OF TEXAS  
BUREAU OF ECONOMIC GEOLOGY

16.0104 ENVIRONMENTAL GEOLOGIC ATLAS C  
TEXAS COASTAL ZONE, GALVESTON-HO  
AREA.

W.L.

UNIV. OF WASHINGTON  
SCHOOL OF ENGINEERING

16.0109 BUILDING STANDARDS AND  
EARTHQUAKE HAZARD FOR THE PUGET  
BASIN.

B.

UNKNOWN INST. OR INDIV. GRANT

16.0002 CONSULTATIVE PSYCHIATRIC SERVIC  
INDIVIDUALS AND COMMUNITY GROUPS AND  
CIES IN RAPID CITY, SOUTH DAKOTA.

C.L. A

16.0050 PUBLIC SAFETY SUBSYSTEM - VOLU  
ANALYSIS OVERVIEW.

UN

16.0051 PUBLIC SAFETY SUBSYSTEM - C  
TUALIZATION TASK COMPLETION REPORT.

UN

16.0096 THE CHARLOTTE CONSORTIUM TASK  
PORT - VOLUME IIA - ANALYSIS OF MUNICI  
TIVITIES - PUBLIC SAFETY SUBSYSTEM.

UN

16.0103 THE WICHITA FALLS CONSORTIUM P  
REPORT - VOLUME III - ANALYSIS OF MUNICI  
TIVITIES - SECTION IV - PUBLIC SAFETY SUBSY

UN

URBAN OBS. OF MET. NASHVILLE

16.0023 DESIGN TO ESTABLISH A FEASIBLE PL  
EMERGENCY MEDICAL CARE, IN  
METROPOLITAN NASHVILLE-MIDDLE TEN  
REGION.

C.E. C

WESTERN HEALTH SYSTEMS INC.

16.0020 TRAINING PROGRAM FOR CRISIS  
VENORS.

UNK

# INVESTIGATOR INDEX

Abdelnal, F.M. -8.0051\*  
 Abersman, A.I. -16.0059\*  
 Abrams, T.G. -9.0023\*  
 Ackroyd, M.H. -3.0061\*  
 Aki, K. -3.0226\*  
 Aklihu, P. -6.0105\*  
 Aktan, A.E. -3.0205\*, 3.0206\*  
 Alford, J.T. -1.0003\*, 2.0002\*, 3.0047\*, 4.0001\*, 5.0026\*,  
 6.0045\*, 7.0009\*, 8.0018\*, 9.0007\*, 10.0003\*, 11.0001\*,  
 12.0011\*, 13.0003\*, 14.0003\*, 15.0003\*, 16.0038\*  
 Alger, R.S. -5.0012\*  
 Algernissen, S.T. -3.0020\*, 3.0024\*, 3.0049\*, 3.0159\*,  
 3.0160\*, 3.0163\*, 3.0218\*, 3.0219\*, 13.0004\*  
 Alldredge, L.R. -3.0019\*  
 Allee, D.J. -6.0334\*, 6.0336\*  
 Allen, C.R. -3.0044, 3.0139\*, 9.0004, 10.0002, 13.0002  
 Allen, D.A. -9.0014  
 Allen, J.B. -2.0015  
 Alnouri, I.A. -9.0016\*  
 Alvares, N.S. -5.0012  
 Andel, F.J. -6.0095  
 Anderson, C.E. -7.0018\*  
 Anderson, D.L. -3.0139, 3.0145  
 Anderson, E.C. -6.0367  
 Anderson, H.E. -5.0018\*  
 Anderson, J.C. -3.0207\*  
 Anderson, J.M. -6.0254  
 Anderson, L.G. -8.0006\*  
 Anderson, W. -6.0230\*  
 Anderson, W.D. -6.0194\*  
 Andrews, W.H. -6.0153\*, 6.0390\*  
 Ang, A.H. -3.0208\*  
 Anthes, R.A. -8.0125\*  
 Arey, D.G. -2.0021\*, 6.0359\*, 8.0124\*  
 Armstrong, D. -3.0149\*, 16.0058\*  
 Armstrong, J.M. -15.0026\*  
 Armstrong, T.R. -16.0078\*  
 Arnold, E. -3.0024  
 Aron, G. -2.0007\*, 6.0144  
 Arulanandan, K. -15.0012\*  
 Arvanitidis, N.V. -6.0173\*, 6.0174\*  
 Atalay, M.B. -3.0084  
 Austin, T.A. -6.0387  
 Auvil, C.J. -5.0033\*  
 Bachman, G.O. -3.0169\*, 9.0040\*  
 Badenhop, M.B. -16.0021\*  
 Bajorunas, L. -6.0207\*  
 Baker, D.G. -6.0301  
 Baker, L.C. -3.0140  
 Baker, R.L. -8.0040  
 Barksdale, H.C. -6.0035  
 Barlow, P.L. -6.0309\*  
 Barnard, J.R. -6.0018\*, 6.0272\*, 16.0084\*  
 Barnes, S.L. -12.0007\*, 12.0023\*, 12.0024\*  
 Barrientos, C. -6.0005\*  
 Bartley, E.R. -6.0231\*, 16.0080\*  
 Basco, D.R. -6.0151\*  
 Bass, F. -16.0018  
 Bates, E.R. -10.0009\*  
 Baughman, R.G. -5.0019\*  
 Baumann, D.D. -2.0021, 6.0359, 8.0124  
 Bayer, K.C. -3.0245\*, 3.0246\*  
 Beard, L.R. -6.0037\*, 6.0378\*  
 Beatty, M.T. -6.0413  
 Bell, G.L. -9.0018  
 Bell, H.A. -8.0042  
 Benjamin, J.R. -3.0136\*  
 Benke, A.C. -6.0238  
 Benson, L.A. -6.0030\*  
 Benuska, K.L. -3.0158  
 Berg, E. -3.0070\*  
 Berger, J. -3.0153\*  
 Bernardi, G.C. -5.0034\*  
 Berry, J.N. -16.0006  
 Bertero, V.V. -3.0073\*, 3.0082, 3.0084, 3.0088  
 Bertle, F.A. -6.0183\*  
 Beyer, L.A. -10.0015\*  
 Bidwell, L.E. -6.0303  
 Bielak, J. -3.0041\*, 3.0043  
 Biggs, J.M. -3.0061, 3.0064, 3.0227, 3.0230  
 Bilhorn, T.W. -8.0049\*  
 Billington, D.P. -3.0068\*  
 Binenko, V.I. -5.0030\*  
 Bisdorf, R.J. -10.0006  
 Black, R.H. -8.0056\*, 16.0027\*  
 Blackwell, J. -6.0295\*, 16.0093\*  
 Blank, H.R. -3.0266\*  
 Blum, M.S. -16.0006  
 Blume, J.A. -3.0154\*  
 Board, J.W. -6.0372\*  
 Boatwright, D.W. -16.0013  
 Bobb, W.H. -8.0038\*, 8.0039\*  
 Bodine, B.R. -8.0072\*  
 Bohn, J.D. -6.0373\*  
 Boland, R.A. -8.0013, 8.0038, 8.0039  
 Bollinger, G.A. -3.0277\*  
 Bolt, B.A. -3.0028\*  
 Bonilla, M.G. -3.0105\*  
 Booker, D.R. -2.0006

Bostrom, R.C. -3.0279\*  
 Bottoms, J. -8.0097\*  
 Bourque, L.B. -3.0074\*  
 Bouwkamp, J.G. -3.0091  
 Bowers, C.E. -6.0113\*, 6.0301  
 Boyd, M.B. -13.0010  
 Boyll, C. -6.0367  
 Brabb, E.E. -3.0106\*, 3.0107\*, 3.0108\*, 3.0109\*, 9.0027\*, 9.0028\*  
 Bradley, C.C. -1.0004\*, 1.0005\*, 1.0013\*  
 Braidech, L.L. -15.0030\*, 15.0031\*  
 Brand, S. -8.0053  
 Brandow, V.D. -6.0086  
 Brater, E.F. -6.0112\*, 6.0299\*  
 Bratten, F.W. -5.0035\*  
 Breaden, J.P. -6.0019\*  
 Brennan, J. -3.0064, 3.0230  
 Brennan, L. -6.0131  
 Bresler, B. -3.0073, 3.0075\*  
 Bridges, W.C. -6.0233\*  
 Brock, D.A. -16.0105\*  
 Brogdon, N.J. -8.0013\*, 8.0040\*  
 Bronowicki, A.J. -3.0009  
 Brooks, J.M. -16.0097\*  
 Brown, B.W. -4.0009\*, 12.0003  
 Brown, C.B. -1.0001, 1.0006  
 Brown, F.R. -8.0042  
 Brown, J.M. -16.0004\*  
 Brown, L.F. -16.0104  
 Brown, M.J. -2.0013\*  
 Brown, M.L. -6.0164\*  
 Brown, M.M. -3.0266  
 Brown, R.L. -1.0013  
 Bryan, M.L. -6.0298  
 Buchananbanks, J.M. -3.0197, 16.0074  
 Buchter, B.J. -6.0368  
 Bullock, P.A. -8.0134  
 Burdge, R.J. -6.0004\*  
 Burford, R.O. -3.0110\*  
 Burnett, J.L. -1.0003, 2.0002, 3.0047, 4.0001, 5.0026, 6.0045, 7.0009, 8.0018, 9.0007, 10.0003, 11.0001, 12.0011, 13.0003, 14.0003, 15.0003, 16.0038  
 Burney, J.R. -6.0269\*  
 Burnham, J.M. -8.0006  
 Burton, L.R. -9.0008  
 Busby, M.W. -6.0039\*, 6.0168\*  
 Butcher, W.S. -6.0150\*  
 Byrne, J.V. -15.0033\*  
 Calhoun, C.C. -3.0232\*, 10.0030\*  
 Callister, -6.0360  
 Camp, F.R. -16.0007\*  
 Camp, J.D. -6.0058\*, 6.0255\*  
 Campbell, C.C. -16.0054  
 Campbell, R.H. -9.0029\*  
 Capiel, M. -2.0022\*  
 Carley, W.J. -2.0008  
 Carlson, R.F. -6.0163\*  
 Carney, R. -9.0039  
 Carns, J.M. -6.0256\*  
 Carpenter, R.A. -10.0026\*  
 Carter, R.W. -6.0222  
 Cassel, D.K. -2.0020  
 Cattermole, J.M. -3.0170\*, 4.0004\*, 9.0041\*  
 Celebi, M. -3.0076\*  
 Chakrabarti, P. -3.0029\*  
 Chandler, M.W. -16.0045  
 Chang, F. -6.0155\*  
 Chang, F.F. -6.0016\*  
 Chang, J.C. -9.0005  
 Chang, T.P. -6.0088\*, 6.0271  
 Changnon, S.A. -2.0004\*, 2.0011, 7.0003, 7.0012, 12.0017\*, 12.0032\*, 16.0082  
 Chase, R.C. -16.0016\*  
 Chatham, C.E. -6.0116\*, 8.0041\*  
 Chavez, M.A. -3.0059  
 Cheatham, L.R. -6.0007\*  
 Chen, S.T. -6.0402  
 Cheng, E.D. -6.0076, 6.0077  
 Cherlin, A. -3.0074  
 Chernenko, A.P. -5.0030  
 Chopra, A.K. -3.0029, 3.0030\*, 3.0031\*, 3.0032\*, 3.0090  
 Chow, V.T. -6.0264\*  
 Christiansen, J.R. -5.0036\*  
 Christiansen, L.M. -3.0171\*  
 Churchill, D.H. -6.0083\*  
 Clark, G.M. -6.0345\*, 6.0346\*, 6.0347\*  
 Clark, H.E. -13.0011\*  
 Clark, J.E. -16.0013\*  
 Clark, M.M. -3.0111\*, 3.0112\*, 3.0113\*  
 Clark, P.C. -9.0013\*  
 Cloud, W.K. -3.0025, 3.0221  
 Clough, R.W. -3.0003, 3.0032\*, 3.0077\*, 3.0158\*  
 Coates, D.R. -15.0027\*  
 Cohen, H. -6.0162\*  
 Coker, A.E. -10.0029\*  
 Cole, D.W. -5.0047\*  
 Coleman, J.M. -8.0008  
 Colgan, S.G. -8.0052\*  
 Collins, R.A. -16.0078, 16.0079\*  
 Colton, C.W. -6.0153  
 Conger, D.C. -6.0407\*  
 Conn, L.C. -6.0370\*  
 Conner, J.R. -6.0066  
 Conte, N.F. -16.0007  
 Contractor, D.N. -6.0396\*  
 Cook, -6.0208\*  
 Cook, B.C. -6.0387  
 Cook, K.L. -3.0276  
 Cooley, J.R. -12.0036\*  
 Cooper, L.W. -2.0006  
 Cooper, R.W. -5.0042\*  
 Copeland, G.E. -5.0032\*  
 Copp, H.D. -6.0402  
 Corbin, A.R. -6.0003  
 Corlett, R.C. -5.0024\*  
 Cornell, C.A. -3.0064, 3.0230  
 Corotis, R.B. -6.0259\*  
 Correll, D. -8.0003\*  
 Corson, M. -16.0062\*

## INVESTIGATOR INDEX

Cox, D.C. -6.0252\*, 13.0021\*  
 Coyle, J.W. -16.0006  
 Coyne, J.V. -3.0022\*  
 Craig, G. -6.0060  
 Crandell, D.R. -14.0007\*  
 Crawford, K.C. -12.0038\*  
 Crawford, W.R. -16.0010\*  
 Criswell, M.E. -8.0014\*  
 Croley, T.E. -6.0018  
 Crosby, A.B. -9.0008  
 Crosby, J.S. -5.0015  
 Crosby, O.A. -6.0138\*, 6.0344\*  
 Cross, W.P. -6.0059\*  
 Crosson, R.S. -3.0280\*  
 Crumpton, C.F. -9.0013  
 Crutcher, H.L. -8.0080\*, 8.0081\*, 8.0082\*, 8.0122\*  
 Culver, C. -16.0073  
 Culver, C.G. -3.0188\*, 6.0001\*, 12.0001\*  
 Dumberbatch, E. -13.0029  
 Dummans, J.E. -6.0403\*, 6.0404\*  
 Dummins, R.S. -8.0014  
 Dunningham, A.B. -6.0322\*  
 Durtis, G.W. -6.0082\*  
 Durtis, T. -6.0178  
 Dushman, R. -6.0060\*  
 Dahl, B.E. -8.0049  
 Daubin, S.C. -15.0017  
 David, F.N. -5.0041\*  
 Davis, D.R. -6.0036  
 Davis, F.J. -9.0008\*  
 Davis, G.W. -6.0257  
 Davis, J.B. -5.0007\*  
 Davis, K. -6.0104  
 Davis, R.A. -8.0118, 15.0024\*, 15.0025  
 Dencon, -6.0182  
 Denngelis, R.M. -8.0123\*  
 Debuchananne, G. -3.0056\*  
 Deen, R.C. -9.0014  
 Dehuesus, A.A. -6.0178  
 Delarve, -6.0175  
 Dellache, A.P. -10.0032\*  
 Dell, J.D. -5.0037\*  
 Delleur, J.W. -6.0270\*  
 Dempster, G.R. -6.0374\*, 6.0382\*  
 Deneufville, R. -3.0064, 3.0230  
 Denoyer, J. -9.0050\*  
 Dergarabedian, P. -8.0054\*, 16.0057\*  
 Desmarais, A.P. -6.0307, 6.0308  
 Deutschman, W.A. -5.0013\*  
 Dibble, T.W. -3.0039\*, 9.0001\*  
 Dickerson, W.H. -6.0406\*  
 Dieterich, J.H. -3.0114\*, 3.0115\*  
 Dikkers, R.D. -3.0055, 8.0074\*, 12.0004  
 Dobrovolsky, E. -3.0172\*  
 Dodd, J.S. -3.0173\*  
 Dodge, E.R. -6.0125\*  
 Doolittle, M.L. -5.0017\*  
 Duckstein, L. -6.0036  
 Ducret, G.L. -6.0048\*, 6.0049\*  
 Duke, C.M. -3.0102\*  
 Dumontelle, P.B. -9.0011  
 Dunkelberger, J.E. -5.0001\*  
 Dunlap, D.V. -6.0021  
 Dunn, B. -6.0331\*  
 Dunphy, G.J. -3.0221  
 Dunrud, C.R. -3.0052\*, 10.0004\*  
 Durr, D.L. -3.0010, 9.0005  
 Dutcher, L.C. -3.0100\*  
 Dvorak, V.F. -8.0075\*  
 Dyachenko, L.N. -5.0030  
 Dynes, R.R. -16.0098\*, 16.0100  
 Eagleson, P.S. -6.0107  
 Easterbrook, C.C. -8.0121\*  
 Eddins, W.H. -6.0342\*  
 Edson, D.T. -6.0209\*  
 Egan, J.P. -3.0012  
 Eichert, B.S. -6.0038\*  
 Elliott, J.A. -6.0307\*, 6.0308\*  
 Elliott, R.D. -6.0171\*  
 Elmore, G.R. -6.0240  
 Emery, R.H. -16.0031\*  
 Emiliani, C. -15.0017\*  
 Emmer, R.E. -6.0353\*  
 Engdahl, E.R. -3.0220\*  
 Engelder, J.T. -3.0260  
 Eskel, A.E. -3.0046\*  
 Estoque, M.A. -8.0096\*  
 Estradauribe, G. -3.0058\*  
 Everett, K.R. -9.0057\*  
 Eytan, J.R. -6.0086  
 Fan, L. -6.0367  
 Fan, P. -15.0018\*  
 Farhoomand, I. -3.0013\*  
 Fattal, S.G. -3.0189\*, 3.0190\*  
 Febrescordero, E. -9.0012  
 Feit, D. -6.0006\*, 8.0113  
 Feldman, A. -6.0038  
 Fendell, F. -16.0057  
 Fendell, F.E. -8.0055\*  
 Fenwick, G.B. -6.0053  
 Fergusson, J.R. -6.0335\*  
 Fernandezpartag, J.J. -2.0010  
 Fett, R.W. -8.0053\*  
 Fields, F.K. -6.0392\*  
 Finck, J.A. -6.0130\*  
 Finlayson, J.B. -14.0015\*  
 Finley, W.E. -12.0003\*  
 Firor, J.W. -7.0010\*  
 Fisher, W.L. -16.0104\*  
 Fitzgerald, D.F. -16.0013  
 Flanders, A.F. -6.0103\*, 8.0108\*  
 Fleischer, A.R. -5.0032  
 Fletcher, D.Q. -10.0005\*, 10.0022, 10.0024  
 Floyd, C.F. -6.0237\*  
 Fok, Y. -6.0026\*



Foster, J.H. -6.0291\*  
 Fox, W.T. -8.0118\*, 15.0024, 15.0025\*  
 Franco, J.J. -6.0312\*  
 Frank, N.L. -8.0084\*  
 Franklin, H.A. -3.0078\*  
 Fransioli, P.M. -11.0006  
 Fraser, W.E. -6.0266  
 Fread, D.L. -6.0124  
 Fredrich, A.J. -6.0037, 6.0038  
 Fredriksen, R.L. -9.0062\*, 15.0034\*  
 Freeman, S.A. -3.0014\*, 3.0048\*  
 Fribourg, H.A. -2.0023  
 Friedman, D.G. -3.0140  
 Friedman, J.D. -1.0009\*, 14.0008\*, 14.0009\*  
 Fujita, T.T. -8.0100\*, 12.0030\*, 12.0031\*  
 Fullerton, C.M. -6.0246\*  
 Fulton, J.C. -3.0140\*  
 Gabrysch, R.K. -10.0011\*, 10.0012\*  
 Gaither, W.S. -8.0070  
 Gardner, J.S. -6.0273\*  
 Garono, L.E. -3.0217\*  
 Garrett, B.J. -6.0095\*  
 Gay, T.E. -1.0003, 2.0002, 3.0047, 4.0001, 5.0026, 6.0045, 7.0009, 8.0018, 9.0007, 10.0003, 11.0001, 12.0011, 13.0003, 14.0003, 15.0003, 16.0038  
 Gedney, L. -3.0071\*  
 Geiger, C.O. -6.0281\*  
 Gentry, R.A. -12.0019\*  
 Gentry, R.C. -8.0057\*, 8.0058\*, 8.0085\*  
 Ghaboussi, J. -3.0209\*  
 Gibbs, K.C. -6.0066  
 Gilbert, P.A. -3.0234  
 Gillis, P.P. -3.0081  
 Glenn, C.L. -6.0391  
 Goddard, J.E. -6.0132\*  
 Goines, W.H. -6.0375\*  
 Gold, -6.0182  
 Golden, H.G. -6.0075\*, 6.0244\*  
 Golden, J.H. -12.0025\*, 12.0039\*  
 Goldsmith, V. -15.0022  
 Gonen, B. -3.0281\*, 16.0109\*  
 Goodridge, J.D. -6.0044\*  
 Goodwin, C.R. -6.0071\*, 8.0027\*  
 Goodwin, G. -9.0035\*  
 Gordon, H. -12.0037\*  
 Gordon, L. -9.0018  
 Gorman, C.T. -9.0015\*  
 Goshen, C.E. -16.0023\*  
 Gosink, T.A. -5.0032  
 Grace, J.L. -6.0117, 8.0043, 8.0044  
 Granju, J. -6.0367  
 Grant, L.O. -7.0013\*  
 Grant, R.S. -6.0248\*  
 Gray, D.H. -9.0051\*, 9.0052\*  
 Gray, W.M. -8.0066\*, 8.0067\*, 8.0068, 8.0069, 12.0028  
 Grayman, W.M. -6.0107\*  
 Green, L.R. -5.0005\*  
 Greene, H.G. -3.0116\*, 9.0030\*  
 Griffin, C.T. -16.0085\*, 16.0086\*  
 Gumper, F.J. -3.0258\*  
 Gupta, I.N. -3.0248\*  
 Gurfinkel, G.R. -3.0207  
 Gurpinar, A. -3.0254  
 Gutierrez, J.A. -3.0030  
 Haas, J.E. -16.0028\*, 16.0061\*  
 Hackett, J.E. -6.0012\*  
 Hadala, P.F. -3.0067, 10.0010  
 Haines, D.A. -5.0015\*, 5.0016, 5.0045\*  
 Hall, C.A. -16.0037  
 Hall, G.F. -9.0057  
 Hall, J.V. -8.0019\*, 15.0004\*  
 Hall, W.J. -3.0059\*  
 Hallgren, R.E. -12.0012\*  
 Halton, D.B. -6.0328  
 Hamel, J.V. -9.0021\*, 9.0054  
 Hamilton, W.F. -16.0018\*  
 Hampton, B.B. -6.0383\*  
 Haney, T.P. -16.0059  
 Hanna, W.J. -5.0032  
 Hunniford, J.F. -6.0171  
 Hannon, J.B. -9.0037  
 Hannum, C.H. -6.0093\*  
 Hansen, W.R. -4.0005\*, 10.0020\*  
 Hanson, H.C. -6.0044  
 Harbaugh, T.E. -6.0122\*, 6.0124\*  
 Hardin, B.O. -3.0060\*, 3.0216\*  
 Harding, S.T. -3.0221  
 Hardy, C.E. -5.0020\*  
 Harenberg, W.A. -6.0254  
 Harker, R.C. -16.0060\*  
 Harmel, R.M. -10.0022  
 Harms, R.W. -11.0005\*  
 Harrison, J. -13.0026  
 Harrison, W. -8.0134\*  
 Hurvey, C.D. -6.0003\*  
 Hauth, L.D. -6.0316\*  
 Havens, J.H. -9.0014\*  
 Hawkins, E.F. -6.0037  
 Hawkins, N.M. -3.0281, 3.0282\*, 16.0109  
 Hayes, C.J. -9.0019\*  
 Hayes, G.S. -6.0287\*  
 Hayes, M.O. -15.0022\*  
 Hays, W.W. -3.0164\*  
 Hedman, R. -6.0090\*  
 Hein, G.F. -16.0047\*  
 Hejl, H.R. -6.0091\*  
 Heller, L.W. -3.0066\*  
 Henderson, T.J. -2.0008\*  
 Hennes, -3.0279  
 Henyey, T.L. -3.0104  
 Herbert, P.J. -8.0005  
 Hetrick, C. -6.0182\*  
 Hill, D.W. -6.0191\*, 6.0239  
 Hill, T.C. -8.0119\*  
 Hincy, R.A. -6.0328  
 Hirsch, S.N. -5.0028, 5.0046\*

# INVESTIGATOR INDEX

Hoeg, K. -3.0137\*  
 Hoerner, J.B. -3.0141\*, 3.0144  
 Hoffman, J.E. -6.0402  
 Holmes, R.M. -3.0271\*  
 Holowaychuk, N. -9.0057  
 Horda, K.K. -3.0014  
 Hong, S. -3.0026  
 Hooper, J.R. -9.0060  
 Hoover, T. -9.0006  
 Hope, J.R. -8.0086\*  
 Hopeman, A.R. -6.0300\*  
 Hopkins, T.C. -9.0014, 9.0015  
 Horn, L.H. -8.0137  
 Horton, A.T. -16.0042\*  
 Horton, J. -6.0210\*  
 Housner, G.W. -3.0140, 3.0142\*  
 Howell, B.F. -3.0268\*  
 Hoyer, M.C. -1.0007\*  
 Hradilek, P.J. -3.0005\*  
 Hsi, G. -3.0195  
 Hsiao, G. -8.0070  
 Hudson, D.E. -3.0042\*, 3.0147  
 Hudson, H.R. -12.0038  
 Hudson, R.Y. -8.0042  
 Huff, F.A. -2.0011\*, 2.0012\*, 12.0033\*, 16.0082\*  
 Huggins, L.F. -6.0269  
 Hulsbos, C.L. -3.0254  
 Hume, J.D. -15.0014\*  
 Hume, P.W. -15.0014  
 Hunter, R.E. -15.0037\*  
 Hwang, L. -13.0015\*  
 Hyftquist, N.B. -6.0273  
 Idress, I.M. -3.0094, 3.0095, 3.0096, 3.0097  
 Ingram, R.L. -2.0019\*, 6.0341\*, 15.0029\*  
 Ingram, R.S. -12.0010\*  
 Ipsen, J. -16.0018  
 Isachsen, Y.W. -3.0256\*  
 Isbell, J.E. -3.0227\*  
 Israelsen, E.K. -6.0031  
 Ives, J.D. -1.0008\*  
 Iwan, W.D. -3.0143\*  
 Iwasaki, T. -3.0003\*  
 Jachowski, R.A. -8.0019, 15.0004  
 Jackson, D.R. -6.0145  
 Jackson, J.G. -3.0067\*, 10.0010\*  
 Jacobs, K.H. -3.0262  
 Jacobsen, S.E. -3.0102  
 James, L.D. -6.0073\*, 6.0092\*, 6.0238\*, 6.0239\*, 6.0240\*  
 Jarvinen, B.R. -8.0087\*, 8.0088\*, 8.0094, 8.0129\*, 8.0130  
 Jay, D. -6.0247\*  
 Jeleznianski, C. -8.0113  
 Jeleznianski, C.P. -8.0059\*, 8.0109\*, 8.0110\*, 8.0111\*  
 Jennings, P.C. -3.0043\*, 3.0044, 3.0140, 3.0144\*, 9.0004, 10.0002, 13.0002  
 Johansen, R.W. -5.0011\*  
 Johnson, A.M. -9.0003\*  
 Johnson, C.G. -6.0106\*, 6.0296\*, 6.0297\*  
 Johnson, D.R. -8.0137\*  
 Johnson, T.W. -6.0012, 6.0398  
 Johnson, V.J. -5.0014\*  
 Johnston, M.J. -3.0117\*  
 Jolissaint, C.H. -6.0173  
 Jones, B.A. -6.0085\*, 6.0265\*  
 Jones, B.G. -3.0257\*  
 Jones, L.A. -7.0002\*  
 Jones, P.H. -3.0243\*  
 Jordan, J.N. -3.0221\*  
 Joyner, W.B. -3.0118\*  
 Julian, B. -3.0146  
 Jungels, P. -3.0145\*  
 Kachic, A.S. -6.0022\*  
 Kalter, R.J. -6.0336  
 Kamel, A.M. -13.0009\*  
 Kammerer, P.A. -6.0408\*  
 Kanaan, A.E. -3.0079\*  
 Kane, M.F. -3.0174\*  
 Kanupp, J.D. -5.0031\*  
 Kapinos, F.P. -6.0401\*  
 Karara, H.M. -6.0086\*  
 Karlsson, B.I. -3.0205  
 Kasiraj, I. -3.0027\*  
 Kates, R.W. -16.0094\*  
 Kaul, M.K. -3.0033\*  
 Kaye, C.A. -15.0023\*  
 Kaynor, E.R. -6.0292\*  
 Keady, D.M. -9.0053\*, 10.0008\*  
 Keene, E. -6.0288\*  
 Keener, C.L. -16.0002\*  
 Keith, E.G. -3.0080\*  
 Keith, W.M. -6.0266\*  
 Kelley, J.W. -6.0337\*  
 Kellogg, F. -3.0269\*  
 Kelly, J.M. -3.0081\*  
 Kelnhofer, G.J. -6.0191  
 Kelnhofer, G.J. -6.0240  
 Kennedy, E.J. -6.0211\*  
 Kennedy, J.J. -6.0154  
 Kennedy, W.C. -16.0097  
 Kenny, J.P. -6.0178\*  
 Kerby, C. -8.0003  
 Kerr, P.F. -9.0017\*, 9.0056\*  
 Kessler, E. -12.0021\*  
 Ketchan, R. -9.0058  
 Keulegan, G.H. -13.0026\*, 13.0027\*  
 Kienle, J. -14.0005\*  
 Kiernan, J.D. -5.0023, 6.0032, 8.0017  
 Killam, E.T. -6.0127\*  
 King, J.L. -8.0104\*  
 King, K.W. -3.0246  
 Kisiel, C.C. -6.0036  
 Kisslinger, C. -3.0239  
 Klein, H. -6.0067\*  
 Klein, L.D. -9.0008  
 Klonglan, G.E. -16.0085, 16.0086, 16.0087  
 Knight, A.L. -6.0161\*

Kondratyev, K.Y. -5.0030  
 Kopachevsky, J.P. -16.0087  
 Kostreba, A. -6.0346  
 Kostreba, A.R. -6.0347  
 Kovach, R.L. -3.0138  
 Kramer, R.W. -3.0171  
 Kramer, S. -16.0073  
 Krawinkler, H. -3.0082\*, 3.0088  
 Kreps, G.A. -16.0098  
 Kroeck, F.W. -6.0243  
 Krueger, D.W. -5.0029\*  
 Kubik, H.E. -6.0038, 6.0167\*  
 Kuo, A. -8.0135\*  
 Kurihara, Y. -8.0120\*  
 Kusler, J.A. -6.0410\*  
 Lachapelle, E. -1.0008, 1.0014\*  
 Lachapelle, E.R. -1.0001\*, 1.0002\*, 1.0006\*  
 Ladage, H.H. -6.0333\*  
 Lahr, J. -3.0259  
 Lambert, B.K. -12.0040  
 Lamoureux, R.L. -16.0039\*  
 Lancaster, J.W. -5.0027\*  
 Landers, H. -8.0127  
 Landers, R.Q. -6.0089, 15.0008  
 Lang, T.E. -1.0013  
 Langemeier, D. -7.0005  
 Lara, O.G. -6.0274\*, 6.0275\*, 6.0276\*, 6.0277\*, 6.0278\*  
 Laswell, T.J. -9.0053  
 Lau, L.S. -6.0076, 6.0077, 6.0078  
 Lau, W.M. -6.0044  
 Laughridge, F.I. -5.0012  
 Laurent, E.A. -6.0239, 6.0240  
 Lawrence, M.B. -8.0091, 8.0132  
 Lawson, M.P. -2.0016\*  
 Leadley, S.M. -6.0360\*  
 Lee, G.B. -6.0411\*, 6.0412, 6.0413  
 Lee, H.W. -6.0253\*  
 Lee, K.L. -3.0037\*, 3.0095, 3.0103\*  
 Lee, R. -6.0249\*  
 Lee, W.H. -3.0119\*  
 Leer, D.K. -9.0018\*  
 Leighton, F.B. -9.0026\*  
 Lembke, W.D. -6.0085  
 Lemke, R.W. -3.0175\*, 10.0021\*, 13.0017\*  
 Leonard, R. -1.0002  
 Lesesne, E.H. -6.0367\*  
 Leven, L.S. -6.0212\*  
 Levine, R.B. -16.0006  
 Lew, H.S. -3.0055\*  
 Lewandowski, E.R. -9.0008  
 Lewellen, R.I. -10.0025\*  
 Leyendecker, E.V. -3.0055  
 Lhermitte, R.M. -12.0026\*  
 Liao, H. -3.0073  
 Liaw, C. -3.0034\*  
 Lijzen, -6.0175\*  
 Lind, A.O. -6.0393\*  
 Lind, R.C. -6.0174  
 Linsley, R.K. -6.0177\*  
 Liou, E.Y. -6.0092, 6.0285\*  
 Lipps, F.B. -8.0120  
 Little, H.C. -2.0017\*  
 Liu, C.S. -6.0131\*, 6.0328  
 Livingston, K. -2.0016  
 Lofgren, B.E. -10.0017\*  
 Long, L.T. -3.0202\*  
 Long, W. -6.0022  
 Losensky, J.B. -5.0028  
 Loucks, D.P. -6.0335  
 Lowham, H.W. -6.0414\*  
 Ludtke, R.L. -6.0004  
 Ludwick, J.C. -5.0032  
 Lucenberger, D.G. -6.0174  
 Lumb, A.M. -6.0074\*, 6.0241\*  
 Lynch, R.D. -3.0244  
 Lysmer, J. -3.0035, 3.0083\*, 3.0093  
 Maccready, P.B. -2.0009\*  
 MacLay, R.W. -6.0303\*  
 Madden, F.H. -5.0028  
 Mader, C.L. -13.0020\*  
 Mahar, J.F. -16.0001  
 Mahin, S.A. -3.0084\*  
 Main, W.A. -5.0015  
 Makdisi, F. -3.0095  
 Malila, W.A. -6.0298  
 Mallis, R.R. -3.0246  
 Malone, S.D. -3.0250, 3.0283, 14.0016  
 Marchese, J.A. -16.0052  
 Marshak, R.J. -16.0108\*  
 Marshall, R.D. -8.0074, 8.0076\*, 8.0078  
 Martinelli, M. -1.0011\*, 1.0012\*  
 Mason, C. -15.0035\*  
 Masri, S.F. -3.0038\*  
 Massey, B.C. -6.0384\*  
 Masteller, M.B. -6.0153  
 Mather, J. -8.0002  
 Mathews, M.J. -13.0026  
 Matthiesen, R.B. -3.0144  
 McBride, J.R. -6.0166\*  
 McCain, J.F. -6.0213\*  
 McClain, W.C. -3.0272\*  
 McClure, F.E. -3.0002, 3.0021\*  
 McCone, A.I. -11.0002\*  
 McConaughy, D. -16.0029\*  
 McCulloch, D. -15.0013\*  
 McCulloch, D.S. -3.0120\*  
 McCutchan, M.H. -5.0004  
 McFadden, J.D. -2.0003\*  
 McGill, J.T. -13.0018\*  
 McGowen, J.H. -16.0104  
 McGrath, P.A. -16.0045  
 McKenzie, D. -3.0146\*  
 McLeskey, H.M. -5.0001  
 McLuckie, B.F. -16.0099\*  
 McNair, E.C. -8.0043\*, 8.0045, 8.0046

Mearns, R.W. -9.0038  
 Mees, R.M. -5.0038\*  
 Mehta, A.J. -8.0024\*, 15.0005\*  
 Mellor, G.L. -8.0120  
 Mellor, M. -1.0008  
 Meredith, D.D. -6.0267\*  
 Merrill, R.H. -9.0009\*  
 Mesri, G. -9.0012\*  
 Mickey, W.V. -3.0050\*, 3.0165\*, 3.0166\*  
 Mikolaj, P.G. -6.0182  
 Miles, J.W. -13.0016\*  
 Milfred, C.J. -6.0411, 6.0412\*  
 Miller, A.H. -2.0010  
 Miller, B.I. -8.0089\*  
 Miller, E.F. -2.0001  
 Miller, E.G. -2.0018\*  
 Miller, E.M. -6.0180\*  
 Miller, G.R. -13.0005\*, 13.0022\*  
 Miller, L. -1.0014  
 Miller, L.J. -12.0026  
 Miller, M.E. -11.0009\*, 12.0020\*  
 Miller, R. -3.0225\*  
 Miller, R.D. -1.0010\*, 4.0006\*, 9.0043\*  
 Minami, T. -3.0085\*  
 Ming, C.O. -6.0034\*, 6.0214\*  
 Minnehan, R.F. -6.0051\*  
 Minnis, M.S. -12.0002\*  
 Minor, J.E. -12.0040\*  
 Mintzer, O.W. -6.0348, 9.0058\*  
 Mitchell, J.K. -6.0265, 9.0025\*  
 Mojibhedli, S. -3.0077  
 Montanarelli, N. -16.0008  
 Montjoy, P. -8.0010\*  
 Morgun, -6.0182  
 Morgan, G. -12.0034\*  
 Morgan, G.M. -7.0015\*  
 Morgan, T.A. -10.0022\*  
 Morisawa, M. -15.0027  
 Morrill, R.A. -6.0287  
 Morse, S.A. -6.0266  
 Muckleston, K.W. -6.0353  
 Mueller, A.C. -6.0402  
 Mulford, C.L. -16.0085, 16.0086\*, 16.0087\*  
 Mullineux, D.R. -14.0001\*, 14.0010\*  
 Mundo, C. -16.0032\*  
 Munson, R.D. -10.0006\*  
 Murakami, T. -8.0098\*, 8.0099\*  
 Murphy, J.R. -3.0244\*  
 Murphy, T.E. -6.0118  
 Myers, V.A. -8.0112\*  
 Nakahara, R.H. -6.0250\*  
 Nason, R.D. -3.0155\*, 3.0156  
 Nathan, K. -6.0323\*  
 Naumann, C.J. -8.0090\*  
 Necioglu, A. -3.0235\*  
 Neilson, J.O. -16.0039  
 Nelson, B.L. -11.0006\*  
 Nelson, W.H. -3.0015\*

Nichols, T.C. -3.0177\*  
 Nickel, S.H. -9.0013  
 Nickerson, J.W. -8.0136\*  
 Nieswandl, G.H. -6.0323  
 Noehre, A.W. -6.0261\*  
 Nolan, K.M. -6.0321\*  
 Nolte, G.S. -6.0046\*  
 Nordlin, E.F. -3.0152\*  
 Norell, W.F. -9.0061\*, 10.0031\*  
 Novlan, D.J. -8.0068\*, 12.0028\*  
 Nur, A. -3.0138\*  
 Nuttli, O.W. -3.0233\*, 3.0235, 3.0236\*, 3.0237\*, 3.0239\*, 3.0241  
 O'Brien, L.J. -3.0244  
 O'Brien, M.P. -8.0024, 15.0005  
 Offield, T.W. -9.0044\*  
 Omholt, T. -15.0028\*  
 Omidvaran, C. -3.0254  
 Oriel, S.S. -3.0178\*, 3.0179\*, 14.0011\*  
 Orkild, P.P. -3.0180\*  
 Orlanski, I. -8.0120  
 Orsborn, J.F. -6.0402\*  
 Ostapoff, F. -8.0060\*  
 Oswalt, N.R. -13.0010\*  
 Otteni, L.C. -8.0049  
 Oudenhoven, M.S. -9.0009  
 Oyen, D.B. -6.0272, 16.0084  
 Pabst, A.F. -6.0301\*  
 Pack, A.B. -6.0289\*, 16.0091\*  
 Pacz, T.L. -3.0215\*, 8.0102\*  
 Page, R. -3.0259\*  
 Palmer, W.C. -2.0024  
 Pampeyan, E.H. -3.0121\*, 16.0055\*  
 Pardue, L.G. -8.0016  
 Parisi, A.M. -8.0070  
 Parker, D.E. -6.0411, 6.0412  
 Parker, M.W. -16.0013  
 Parks, W.L. -2.0023\*  
 Pauley, D.E. -16.0107\*  
 Paulson, O.L. -4.0009  
 Pecknold, D.A. -3.0206  
 Peebles, J.J. -6.0080\*  
 Pelissier, J.M. -8.0092\*  
 Pelton, D.J. -16.0045  
 Penterman, D.G. -16.0014\*  
 Penzien, -3.0086\*  
 Penzien, J. -3.0003, 3.0076, 3.0087\*, 3.0098  
 Perrotti, H.P. -8.0116  
 Perry, C.A. -12.0003  
 Peterson, D.W. -3.0057\*, 14.0001, 14.0004\*  
 Petrauskas, C. -13.0001\*  
 Petropoulos, D.P. -6.0173, 6.0174  
 Phelps, W.R. -6.0014\*  
 Phillips, R. -2.0016  
 Philpot, C.W. -5.0003  
 Pickering, G.A. -6.0117\*, 6.0118\*, 8.0044\*  
 Pickett, A.G. -3.0265  
 Pierce, K.L. -6.0185\*, 9.0045\*  
 Pike, A.C. -8.0091\*

Poage, J.L. -6.0173  
 Poffenroth, D.N. -10.0023  
 Poland, J.F. -10.0018\*, 10.0019\*  
 Polcyn, F.C. -6.0298  
 Poole, D.H. -9.0036\*, 9.0063\*  
 Popov, E.P. -3.0082, 3.0088\*, 3.0089\*  
 Pore, N.A. -8.0113\*, 8.0114\*, 8.0115\*, 8.0116\*, 8.0134  
 Powell, G.H. -3.0079  
 Preisendorfer, R.W. -13.0023\*  
 Prendergast, J.D. -3.0203\*  
 Pritchard, D.W. -8.0009  
 Promersberger, W.J. -7.0006\*  
 Prostka, H.J. -3.0185, 14.0013  
 Prysock, R.H. -3.0010, 3.0012\*  
 Puleo, J. -9.0037  
 Purpura, J.A. -15.0016\*  
 Purvis, J.C. -5.0031, 8.0127\*  
 Putnam, A.L. -6.0134\*, 6.0135\*, 6.0136\*, 6.0343\*  
 Pyle, R.L. -16.0067\*  
 Quarantelli, E.L. -16.0049\*, 16.0098, 16.0100\*  
 Quintan, F.T. -8.0080, 8.0081, 8.0082  
 Quinn, F.H. -6.0207  
 Quinn, W.L. -16.0008\*  
 Rachford, T.M. -6.0144  
 Radbruchhall, D.H. -9.0002\*  
 Raetz, R.L. -6.0391  
 Rafuse, R.W. -6.0101\*  
 Rainey, C.T. -16.0053\*  
 Raleigh, C.B. -3.0123\*  
 Ramey, L.H. -12.0020  
 Ramirez, J.M. -2.0020\*  
 Rao, A.R. -6.0270  
 Rao, D.B. -8.0138\*  
 Rao, G.V. -6.0126  
 Raphael, J.M. -3.0077  
 Raven, B.H. -3.0074  
 Ray, D. -3.0090\*  
 Raymond, D.J. -6.0246  
 Ren, D. -3.0091\*  
 Redlinger, J.F. -9.0054\*  
 Reed, J.W. -3.0026, 12.0018\*  
 Reeder, L.G. -3.0074  
 Reich, B.M. -6.0144\*, 6.0145\*, 6.0146\*, 6.0355\*, 6.0356\*, 6.0361\*  
 Reinbolt, O.L. -16.0006  
 Reiss, A. -2.0016  
 Reps, W.F. -3.0191\*, 8.0077\*  
 Reynolds, J.E. -6.0066\*  
 Rheinfrank, J. -6.0347  
 Ricca, V.T. -6.0348\*  
 Rice, R.M. -6.0041\*, 15.0002\*  
 Rich, E.I. -9.0003  
 Richard, D. -4.0008\*, 16.0062\*  
 Richards, D.B. -6.0282\*  
 Richards, P.G. -3.0260  
 Richardson, W.S. -8.0113, 8.0116  
 Richmond, A.P. -6.0257  
 Richmond, R.D. -4.0007\*  
 Rihsame, W. -2.0010  
 Roach, J.T. -6.0337  
 Robbins, S.L. -3.0124\*  
 Roberts, W.J. -15.0020\*  
 Robinson, -3.0204\*  
 Rodabaugh, E.C. -3.0265\*  
 Roehm, I.H. -3.0053\*  
 Roesset, J.M. -3.0228\*  
 Rogers, C.W. -8.0121  
 Rogers, T.H. -3.0156\*  
 Roller, J.C. -3.0125\*  
 Rosenthal, S.L. -8.0061\*, 8.0062\*  
 Rosing, J. -6.0173, 6.0174  
 Ross, G.A. -6.0092  
 Russ, J.L. -16.0017\*  
 Ross, T.G. -6.0325\*  
 Royer, T.C. -13.0012\*  
 Rupp, W.E. -16.0010  
 Rush, E.J. -16.0101\*  
 Russell, E.E. -9.0053, 10.0008  
 Russell, R.J. -2.0014\*  
 Ryall, A. -3.0249\*, 3.0250\*  
 Ryan, B.C. -5.0004  
 Sachs, A. -5.0023\*, 6.0032\*, 8.0017\*  
 Saffir, H.S. -8.0007\*  
 Sager, R.A. -8.0045\*, 8.0046\*  
 Sakamoto, C.M. -7.0016\*, 11.0006  
 Sando, R.W. -5.0016\*  
 Sattinger, I.J. -6.0298  
 Snuer, V.B. -6.0139\*, 6.0216\*  
 Sav, G.T. -16.0030\*  
 Savage, J.C. -3.0126\*, 3.0127\*  
 Sayre, D.M. -6.0376  
 Schalk, M. -15.0014  
 Scheffer, S.L. -2.0001\*  
 Scherer, M. -8.0063\*, 8.0064\*  
 Schickedanz, P.T. -7.0003\*  
 Schiesl, J.W. -6.0103  
 Schiff, A.J. -3.0023\*  
 Schinke, H.E. -5.0005  
 Schleicher, D. -3.0181\*, 14.0012\*  
 Schlocker, J. -9.0032\*  
 Schnabel, P.B. -3.0035\*, 3.0083, 3.0092\*, 3.0093\*  
 Schniete, W.E. -3.0007  
 Scholl, R.E. -3.0013, 3.0016\*  
 Scholz, C. -3.0258  
 Scholz, C.H. -3.0260\*  
 Schreiber, E. -3.0260  
 Schroeder, E.E. -6.0061\*  
 Schroeder, M.J. -5.0040\*  
 Schroeder, W.L. -9.0020\*  
 Schubel, J.R. -8.0009\*  
 Schulz, E. -6.0190  
 Schwab, G.O. -9.0059\*  
 Schwob, H.H. -6.0279\*, 6.0280\*  
 Scott, A.G. -6.0129\*  
 Scott, N.H. -3.0025  
 Scowcroft, P.G. -5.0039\*  
 Scully, J. -9.0022\*

Senatore, S.J. -2.0001  
 Shabman, L.A. -6.0397\*  
 Shah, A.A. -3.0091  
 Shah, H.C. -3.0040\*, 3.0046, 3.0136  
 Shea, D.J. -8.0069\*  
 Sheaffer, J.R. -6.0257\*  
 Shearman, J.O. -6.0062\*  
 Shen, C. -9.0025  
 Shen, H.W. -6.0191  
 Sherman, J.O. -6.0409\*  
 Sherman, M.D. -6.0101  
 Shih, C. -6.0153  
 Shih, C.G. -6.0031  
 Shroder, J.F. -9.0055\*  
 Sikdar, D.N. -7.0018  
 Simiu, E. -3.0191, 8.0077  
 Simmons, H.B. -6.0119\*, 8.0047\*, 8.0048  
 Simons, D. -6.0189\*  
 Simons, D.B. -6.0050\*  
 Simpson, J. -2.0005\*, 2.0010  
 Simpson, R.H. -8.0005\*, 8.0094\*, 8.0130\*, 8.0131\*, 8.0132\*  
 Singer, J.A. -6.0169\*  
 Singh, K.P. -6.0263\*  
 Skattum, K.S. -3.0045\*  
 Skipp, B. -3.0182\*, 9.0046\*  
 Skog, -16.0035\*  
 Skogman, D.P. -16.0024\*  
 Slorp, L.H. -6.0086  
 Smalley, H.E. -16.0006\*  
 Smith, C.H. -6.0368\*  
 Smith, D.G. -6.0209  
 Smith, G.L. -6.0154  
 Smith, R.B. -3.0275\*, 3.0276  
 Smith, R.L. -14.0014\*  
 Smith, R.W. -16.0078  
 Smith, S.W. -3.0283\*, 14.0016\*  
 Smith, T.W. -9.0038\*  
 Smith, W.C. -9.0011\*  
 Snavely, P.D. -3.0128\*  
 Sniedovich, M. -6.0036\*  
 Snow, A.J. -3.0002  
 Snow, S.P. -6.0157\*  
 Soles, N.F. -3.0195, 12.0004\*  
 Sonquist, -6.0182  
 Sonu, C.J. -8.0103\*  
 Sorensen, R.M. -8.0128, 15.0035, 15.0036  
 Soule, P.L. -6.0400\*  
 Sozen, M.A. -3.0205, 3.0206, 3.0210, 3.0211\*, 3.0212\*, 3.0214  
 Spaeth, M.G. -13.0007\*  
 Spear, R.E. -3.0022  
 Spencer, D.W. -6.0317\*  
 Spencer, G.S. -9.0054  
 St. William, F. -1.0013  
 Stants, W. -6.0104\*  
 Stallings, R.A. -16.0033\*  
 Stauder, W. -3.0239, 3.0240\*, 3.0241\*  
 Steger, R.D. -6.0389\*  
 Steinbruggen, K.V. -3.0002\*, 3.0025\*, 3.0150\*, 3.0200\*  
 Stewart, H.B. -8.0065\*  
 Stewart, S.W. -3.0129\*  
 Still, J.C. -10.0022  
 Stoker, J.R. -3.0152  
 Stokoe, K.H. -3.0273\*  
 Streeter, V.L. -3.0231\*  
 Strunk, R.W. -16.0037  
 Sugg, A.L. -8.0016\*  
 Sutherland, J.L. -2.0006\*  
 Swanson, D.A. -14.0006\*  
 Swanston, D.N. -9.0024\*  
 Swaye, F.J. -8.0002\*, 8.0008  
 Sykes, L. -3.0263  
 Sykes, L.R. -3.0261\*, 3.0262\*  
 Sylvester, A. -3.0157\*  
 Tabler, R.D. -11.0008\*  
 Taggart, J. -3.0167\*  
 Takahashi, S.K. -3.0007\*  
 Talbert, B.R. -16.0023  
 Talebagha, G. -3.0062\*  
 Talkant, I.C. -8.0048\*  
 Tang, J. -3.0251\*  
 Tang, W.H. -3.0208  
 Tarr, A.C. -3.0051\*, 3.0168\*, 3.0220, 3.0222\*  
 Tate, C.H. -6.0114\*, 6.0115\*  
 Tayfun, M.A. -8.0070  
 Taylor, A.D. -8.0059  
 Taylor, W. -12.0027\*  
 Tedrow, A.C. -6.0131, 6.0328\*  
 Teng, T. -3.0104\*  
 Terenzio, V.J. -2.0001  
 Tesch, W.J. -10.0023\*  
 Tetelman, A.S. -15.0001\*  
 Thatcher, W. -3.0130\*  
 Thom, H.C. -8.0074, 8.0078\*  
 Thomas, C.A. -6.0063\*, 6.0254\*  
 Thomas, J.W. -16.0018  
 Thomas, L.C. -16.0001\*  
 Thomas, M.D. -6.0193\*  
 Thomas, W. -6.0217\*  
 Thompson, J.E. -6.0122  
 Thompson, W.O. -6.0092  
 Thomson, F.J. -6.0298\*  
 Thorhaug, A. -6.0070\*  
 Thurber, S. -6.0003  
 Tiedemann, D.A. -3.0183\*  
 Tiedemann, H.R. -16.0026  
 Tipton, R.E. -9.0009  
 Tocher, D. -3.0155  
 Toebes, G.H. -6.0088, 6.0271\*  
 Towery, N.G. -7.0008  
 Townsend, F.C. -3.0234\*  
 Trifunac, M.D. -3.0147\*  
 Trimble, A.B. -3.0275  
 Trock, W.L. -10.0001\*  
 Tseng, W. -3.0098\*  
 Tsiourtis, N.X. -6.0123  
 Tucker, R. -6.0104

Vanmatcke, L.H. -3.0004\*, 3.0230\*  
 Vanwormer, J. -3.0071  
 Vargo, S.M. -16.0097  
 Varley, E. -13.0029\*  
 Venkataraman, R. -13.0029  
 Vernon, N. -6.0212  
 Villone, P. -16.0009\*  
 Vlcek, C.I. -12.0022\*  
 Volk, B.G. -10.0028\*  
 Vonhuene, R. -3.0131\*  
 Vorst, J.J. -7.0004\*  
 Waananen, A.O. -6.0043\*, 6.0176\*  
 Waelti, J.J. -6.0306\*  
 Wagner, H.C. -3.0132\*, 9.0033\*, 13.0014\*  
 Wagner, W.P. -15.0038\*  
 Wahby, A. -6.0286\*  
 Waite, L.A. -6.0020\*  
 Walker, W.R. -6.0013\*, 6.0398\*, 6.0399\*  
 Wallace, J.R. -6.0242\*  
 Wallace, R.E. -3.0133\*  
 Walton, D.M. -3.0074  
 Waltz, F.A. -6.0030  
 Wang, R. -6.0078\*  
 Wanless, H.R. -15.0017  
 Ward, F.R. -5.0037  
 Ward, P.L. -14.0002\*  
 Ward, S.H. -3.0276\*  
 Wasson, B.E. -6.0310\*  
 Waters, A.W. -12.0029\*  
 Waters, R.L. -6.0307, 6.0308  
 Watson, A.G. -16.0023  
 Watts, F.J. -6.0050  
 Webber, E.E. -6.0349\*  
 Weber, E.E. -6.0059  
 Weickmann, H. -7.0012\*  
 Weickmann, H.K. -11.0003\*  
 Welby, C.W. -6.0137\*  
 Wellisch, J.B. -16.0059  
 Wells, D.M. -6.0387\*  
 Wells, J.D. -3.0184\*, 6.0188\*, 9.0048\*  
 Wen, Y.K. -3.0213\*, 8.0101\*, 12.0035\*  
 Wesson, R.L. -3.0134\*, 3.0135\*  
 Whalin, R.W. -13.0028\*  
 Whetstone, B.H. -6.0222\*  
 Whipple, W. -6.0324\*  
 White, F.M. -8.0126\*  
 White, G. -16.0028  
 White, R.M. -2.0005  
 Whitman, R.V. -3.0026\*, 3.0063\*, 3.0064\*, 3.0229\*, 3.0230\*  
 Whittaker, R.H. -5.0021\*  
 Wibben, H.C. -6.0371\*  
 Wickham, G.E. -16.0026  
 Wiggan, S.H. -3.0004\*, 3.0007\*  
 Wight, J.K. -3.0214\*  
 Wilkes, D. -6.0293\*, 6.0294\*  
 Willeke, G.E. -6.0243\*  
 Willey, R.G. -6.0167  
 Williams, D.T. -5.0043\*  
 Williams, G.L. -6.0385\*  
 Williams, P. -6.0391\*  
 Williams, P.L. -3.0185\*, 14.0013\*  
 Williams, T.T. -6.0126\*  
 Williamson, T.N. -16.0026\*  
 Willis, C.E. -6.0105  
 Wilson, E.L. -3.0099\*  
 Wilson, H.B. -8.0042  
 Wilson, J. -6.0060  
 Wilson, J.A. -6.0089\*, 15.0008\*  
 Wilson, K.V. -6.0065\*, 6.0311\*  
 Wilson, R.A. -5.0028\*  
 Wiltshire, L.L. -5.0012  
 Winikka, C. -10.0014\*  
 Winslow, A.G. -10.0013\*  
 Winter, T.C. -6.0303  
 Wirsching, P.H. -3.0252\*  
 Wittman, J. -12.0040  
 Wood, J.H. -3.0148\*  
 Woodard, D.W. -8.0049  
 Woodley, W.L. -2.0005, 2.0010\*  
 Woollard, G.P. -13.0024\*  
 Wright, F.D. -10.0007\*  
 Wright, H.A. -5.0022\*  
 Wright, L.D. -8.0008\*  
 Wright, R.N. -3.0192\*, 16.0073\*  
 Wright, S.G. -9.0023  
 Wu, I. -6.0078  
 Wu, T.H. -9.0060\*  
 Wunderlich, W.O. -6.0367  
 Wylie, E.B. -3.0231  
 Wyss, M. -3.0263\*  
 Yamate, G. -5.0044\*  
 Yang, C.Y. -8.0070\*  
 Yanggen, D.A. -6.0411, 6.0413\*  
 Yao, J.T. -3.0023, 3.0027, 3.0215, 3.0251, 3.0252, 3.0253\*,  
 3.0254\*, 3.0255, 8.0102  
 Yents, R.S. -3.0264\*  
 Yeh, H.Y. -3.0255\*, 3.0274\*  
 Yerkes, R.F. -3.0006\*, 9.0034\*  
 Yevjevich, V. -6.0190\*  
 Yoder, S.M. -9.0014  
 Yokel, F.Y. -3.0193\*, 3.0194\*, 3.0195\*  
 Youd, T.L. -16.0056\*  
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## AVALANCHES

**J.T. ALFORE**, State Div. of Mines & Geology

**1.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

**C.C. BRADLEY**, Montana State University, School of Letters

**1.0004 ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN**

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**1.0005 ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION**

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**1.0013 SNOW PACK STABILITY INDICES RELATIVE TO THE CLIMAX AVALANCHE**

**J.D. FRIEDMAN**, U.S. Dept. of the Interior, Geological Survey

**1.0009 THERMAL SURVEILLANCE OF ACTIVE VOLCANOES**

**M.C. HOYER**, Arizona State University, School of Liberal Arts

**1.0007 PUGET PEAK AVALANCHE, ALASKA**

**J.D. IVES**, Univ. of Colorado, Inst. of Arctic & Alpine Res.

**1.0008 DEVELOPMENT OF METHODOLOGY FOR EVALUATION AND PREDICTION OF AVALANCHE HAZARD IN THE SAN JUAN MOUNTAINS OF COLORADO**

**E. LACHAPPELLE**, State Dept. of Highways

**1.0014 AVALANCHE CONTROL IMPLEMENTATION STUDY**

**E.R. LACHAPPELLE**, State Dept. of Highways

**1.0001 AVALANCHE STUDIES, 1971-1972**

**E.R. LACHAPPELLE**, Univ. of Washington, School of Arts

**1.0002 NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS**

**E.R. LACHAPPELLE**, State Dept. of Highways

**1.0006 AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT**

**M. MARTINELLI**, Colorado State University, U.S.D.A. Rocky

**M. MARTINELLI**, U.S. Dept. of Agriculture, Rocky Mtn. For. & Rg. Ex. Sta.

**1.0012 PHYSICAL PROPERTIES OF ALPINE SNOW AS RELATED TO WEATHER AND AVALANCHE CONDITIONS**

**R.D. MILLER**, U.S. Dept. of the Interior, Geological Survey

**1.0010 SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA**

## DROUGHTS

**J.T. ALFORE**, State Div. of Mines & Geology

**2.0002 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)**

**D.G. AREY**, Univ. of Pittsburgh, Graduate School

**2.0021 ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS**

**G. ARON**, Penn. State University, Inst. Res. Land & Wtr. Resour.

**2.0007 HYDROLOGIC SYSTEMS MODELING AND SIMULATION**

**M.J. BROWN**, Kansas State University, Agricultural Experiment Sta.

**2.0013 DROUGHT IN KANSAS**

**M. CAPIEL**, Univ. of Puerto Rico, Agricultural Experiment Sta.

**2.0022 DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO**

**S.A. CHANGNON**, Univ. of Illinois, State Water Survey Division

**2.0004 STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER**

**T.J. HENDERSON**, Atmospherics Incorporated

**2.0008 PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV)**

**F.A. HUFF**, State Water Survey

**2.0011 DROUGHT CLIMATOLOGY OF ILLINOIS**

**F.A. HUFF**, State Water Survey

**2.0012 POTENTIAL OF PRECIPITATION MODIFICATION IN MODERATE TO SEVERE DROUGHTS**



M.P. LAWSON, Univ. of Nebraska, School of Arts

- 2.0016 NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE

H.C. LITTLE, Univ. of Nevada, Agricultural Experiment Sta.

- 2.0017 ECONOMIC EVALUATION OF USE AND DEVELOPMENT OF WATER AND LAND RESOURCES

P.B. MACCREADY, Flight Test Research Inc.

- 2.0009 HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I

J.D. MCFADDEN, U.S. Dept. of Commerce, Research Flight Facility

- 2.0003 CENTRAL FLORIDA SEEDING PROJECT

J.C. MCWHORTER, Mississippi St. University, School of Agriculture

- 2.0015 SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI

E.G. MILLER, U.S. Dept. of the Interior, Geological Survey

- 2.0018 THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY

W.L. PARKS, Univ. of Tennessee, School of Agriculture

- 2.0023 DROUGHT PROBABILITIES IN TENNESSEE

J.M. RAMIREZ, North Dakota State University, Agricultural Experiment Sta.

- 2.0020 DROUGHT AND WET SPELLS IN NORTH DAKOTA

R.J. RUSSELL, Louisiana State Univ. Systems, Coastal Studies Institute

- 2.0014 BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT

S.L. SCHEFFER, Parsons Jurden Corporation

- 2.0001 STUDY OF SEAWATER DESALTING AS EMERGENCY WATER SUPPLY FOR NEW YORK CITY

J. SIMPSON, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 2.0005 JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT

J.L. SUTHERLAND, Weather Sciences Incorporated

- 2.0006 OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM (ODROP)

J.V. VAIKSNORAS, U.S. Dept. of Commerce, Natl. Weather Service

- 2.0024 METEOROLOGICAL DROUGHT IN TENNESSEE

W.L. WOODLEY, U.S. Dept. of Commerce, Environ. Research

## EARTHQUAKES

M.H. ACKROYD, Mass. Inst. of Technology, School of Engineering

- 3.0061 THE FORMULATION AND EXPERIMENTAL VERIFICATION OF MATHEMATICAL MODELS FOR PREDICTING DYNAMIC RESPONSE OF MULTISTORY BUILDINGS

K. AKI, Mass. Inst. of Technology, School of Science

- 3.0226 SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM

A.E. AKTAN, Univ. of Illinois, School of Engineering

- 3.0205 STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS

A.E. AKTAN, Univ. of Illinois, School of Engineering

- 3.0206 EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN

J.T. ALFORE, State Div. of Mines & Geology

- 3.0047 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

S.T. ALGERMISSEN, U.S. Dept. of the Interior, Geological Survey

- 3.0020 SEISMIC RISK - FDAA - WASHINGTON AND UTAH

S.T. ALGERMISSEN, U.S. Dept. of Commerce, Natl. Ocean Survey

- 3.0024 STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX B

S.T. ALGERMISSEN, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0049 TSUNAMI RESEARCH

S.T. ALGERMISSEN, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0159 ENG AFTERSHOCK STUDIES - CALIFORNIA

S.T. ALGERMISSEN, U.S. Dept. of Commerce, Earth Sciences Laboratories

- 3.0160 THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT

S.T. ALGERMISSEN, U.S. Dept. of the Interior, Geological Survey

- 3.0163 RISK MAPS AND FIELD INVESTIGATIONS

S.T. ALGERMISSEN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

- 3.0218 RESEARCH STUDIES AND REPORTS ON EARTHQUAKE HAZARDS REDUCTION

S.T. ALGERMISSEN, U.S. Dept. of Commerce, Natl. Ocean

- I.R. ALLDREDGE**, U.S. Dept. of Commerce, Environ. Research Laboratories  
3.0019 ENGINEERING SEISMOLOGY
- C.R. ALLEN**, Calif. Inst. of Technology, Graduate School  
3.0139 CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES
- J.C. ANDERSON**, Univ. of Illinois, Graduate School  
3.0207 SEISMIC BEHAVIOR OF FRAMED TUBES
- A.H. ANG**, Univ. of Illinois, School of Engineering  
3.0208 PROBABILISTIC METHODS IN CIVIL ENGINEERING
- D. ARMSTRONG**, Tri Cities Seismic Safe. Study  
3.0149 THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN
- G.O. BACHMAN**, U.S. Dept. of the Interior, Geological Survey  
3.0169 SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO
- J.P. BALSARA**, U.S. Army, Waterways Experiment Station  
3.0065 STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047)
- K.C. BAYER**, U.S. Dept. of Commerce, Earth Sciences Laboratory  
3.0245 SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972
- K.C. BAYER**, U.S. Dept. of Commerce, Earth Sciences Laboratory  
3.0246 EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971
- J.R. BENJAMIN**, Stanford University, School of Engineering  
3.0136 APPLICATION OF DECISION THEORY IN STRUCTURAL DESIGN FOR RESISTANCE TO LOADINGS GENERATED BY EARTHQUAKE PHENOMENA
- E. BERG**, Univ. of Alaska, Geophysical Institute  
3.0070 CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA
- J. BERGER**, Univ. of California, Graduate School  
3.0153 EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA
- V.V. BERTERO**, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0073 STIFFNESS DEGRADATION OF REINFORCED CONCRETE MEMBERS SUBJECTED TO CYCLIC FLEXURAL MOMENTS
- J. BIELAK**, Calif. Inst. of Technology, Earthquake Engin. Res. Lab.  
3.0041 EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS
- H.R. BLANK**, Univ. of Oregon, School of Liberal Arts  
3.0266 SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970
- J.A. BLUME**, John A. Blume & Associates  
3.0154 ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE
- G.A. BOLLINGER**, Virginia Polytechnic Institute, School of Arts  
3.0277 SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION
- B.A. BOLT**, Univ. of California, School of Letters  
3.0028 STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES
- M.G. BONILLA**, U.S. Dept. of the Interior, Geological Survey  
3.0105 RELATIVE ACTIVITY OF MULTIPLE FAULT STRANDS - CALIFORNIA
- R.C. BOSTROM**, Univ. of Washington, School of Arts  
3.0279 DYNAMIC STABILITY OF EARTH STRUCTURES
- L.B. BOURQUE**, Univ. of California, Survey Research Center  
3.0074 THE UNPREDICTABLE DISASTER IN A METROPOLIS - PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971
- E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey  
3.0106 SANTA CRUZ COUNTY COOP
- E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey  
3.0107 EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION
- E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey  
3.0108 REGIONAL GEOLOGICAL FRAMEWORK, NORTH CENTRAL SAN ANDREAS FAULT - CALIFORNIA
- E.E. BRABB**, U.S. Dept. of the Interior, Geological Survey  
3.0109 ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA
- B. BRESLER**, Univ. of California, School of Engineering  
3.0075 EARTHQUAKE SAFETY OF SCHOOL BUILDINGS
- R.O. BURFORD**, U.S. Dept. of the Interior, Geological Survey  
3.0110 FAULT ZONE TECTONICS (CREEP) - CALIFORNIA
- C.C. CALHOUN**, U.S. Army, Waterways Experiment Station  
3.0232 VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLOGY INVESTIGATIONS - SOILS PHASE)
- J.M. CATTERMOLLE**, U.S. Dept. of the Interior, Geological Survey  
3.0170 GEOLOGY OF THE RAPID CITY AREA, SOUTH DAKOTA
- M. CELEBI**, Univ. of California, Earthquake Engin. Res. Ctr.

# EARTHQUAKES

P. CHAKRABARTI, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0029 EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION

A.K. CHOPRA, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0030 EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS INCLUDING FOUNDATION INTERACTION

A.K. CHOPRA, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0031 EARTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS

L.M. CHRISTIANSEN, U.S. Dept. of the Interior, Bureau of Reclamation  
3.0171 EARTH AND ROCKFILL DAM DESIGN PRACTICES

M.M. CLARK, U.S. Dept. of the Interior, Geological Survey  
3.0111 SAN ANDREAS FAULT - CALIFORNIA COOP.

M.M. CLARK, U.S. Dept. of the Interior, Geological Survey  
3.0112 SOUTHERN CALIFORNIA TECTONICS

M.M. CLARK, U.S. Dept. of the Interior, Geological Survey  
3.0113 REGIONAL TECTONIC ANALYSIS - SAN ANDREAS FAULT - INVESTIGATION OF HORRIGO MOUNTAIN EARTHQUAKE, APRIL 8, 1968 (CALIFORNIA (ABREVE))

R.W. CLOUGH, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0032 ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION

R.W. CLOUGH, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0077 ADAP - A COMPUTER PROGRAM FOR STATIC AND DYNAMIC ANALYSIS OF ARCH DAMS

R.W. CLOUGH, I.Y. Hui & Associates  
3.0158 FEA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGH RISE BUILDINGS

J.V. COYNE, Public Administration Service  
3.0022 REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABREVE)

R.S. CROSSON, Univ. of Washington, School of Arts  
3.0280 A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK

C.G. CULVER, U.S. Dept. of Commerce, Natl. Bureau of Standards  
3.0188 BUILDING PRACTICES FOR DISASTER MITIGATION

T.W. DIBBLE, U.S. Dept. of the Interior, Geol. Survey  
3.0039 REGIONAL GEOLOGIC FRAMEWORK - SAN ANDREAS FAULT - CALIFORNIA

J.H. DIETTERICH, U.S. Dept. of the Interior, Geol. Survey  
3.0114 EARTHQUAKE MODELING

J.H. DIETTERICH, U.S. Dept. of the Interior, Geol. Survey  
3.0115 EARTHQUAKE CONTROL EXPERIMENT - ILLINOIS

E. DOKHOVICH, U.S. Dept. of the Interior, Geol. Survey  
3.0172 GREATER ANCHORAGE AREA - ALASKA

J.S. DODD, U.S. Dept. of the Interior, Bureau of Reclamation  
3.0170 EARTHQUAKES AND ACTIVE TECTONICS

C.M. DUKE, Univ. of California, School of Engineering  
3.0102 OPTIMIZATION OF WALL SYSTEMS INCORPORATING EARTHQUAKE RESISTANCE

C.R. DUNRUD, U.S. Dept. of the Interior, Geol. Survey  
3.0052 COAL MINE INFORMATION SYSTEM - COLORADO

E.C. DUTCHER, U.S. Dept. of the Interior, Geol. Survey  
3.0100 RECONNAISSANCE STUDY OF EARTHQUAKE AND GROUNDWATER

F.R. ENGBAHL, U.S. Dept. of Commerce, Natl. Bureau of Standards  
3.0220 SEISMIC SEISMICITY - MICHIGAN

A.L. ESKEL, U.S. Dept. of Water Resources  
3.0046 MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SWITCHGEAR EQUIPMENT

G. ESTRADABUENO, Univ. of Illinois, School of Engineering  
3.0098 OBSERVATION OF EARTHQUAKE DAMAGE TO BUILDINGS AND STRUCTURES

E. FARHODMAND, Univ. of Illinois, School of Engineering  
3.0014 INVESTIGATION OF EARTHQUAKE DAMAGE RELATIONSHIPS FOR BUILDINGS OF GENERAL CALIFORNIA SANDHILL EARTHQUAKE EARTHQUAKE

S.G. FATHALLAH, U.S. Dept. of Commerce, Natl. Bureau of Standards  
3.0189 SEISMICITY OF EARTHQUAKE

S.G. FATHALLAH, U.S. Dept. of Commerce, Natl. Bureau of Standards  
3.0190 SEISMIC RESPONSE OF BUILDINGS AND STRUCTURES

R.A. FORSYTH, U.S. Dept. of Highway  
3.0010 EARTHQUAKE STRUCTURAL DESIGN

H.A. FRANKLIN, U.S. Dept. of the Interior, Geol. Survey  
3.0078 SEISMIC ANALYSIS OF

**STUDIES FROM THE SAN FERNANDO EARTHQUAKE (ABBREV)**

- J.C. FULTON**, Calif. Inst. of Technology, Center For Res. Prev. Disaster  
**3.0140** EARTHQUAKES AND INSURANCE - ERA CONFERENCE 2-3 APRIL 1973
- L.E. GARONO**, U.S. Army  
**3.0217** DENVER EARTHQUAKES
- L. GEDNEY**, Univ. of Alaska, Geophysical Institute  
**3.0071** EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA
- J. GHABOUSI**, Univ. of Illinois, School of Engineering  
**3.0209** ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES
- B. GONEN**, Univ. of Washington, School of Engineering  
**3.0281** BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN
- H.G. GREENE**, U.S. Dept. of the Interior, Geological Survey  
**3.0116** MONTEREY BAY - CALIFORNIA
- P. GULKAN**, Univ. of Illinois, School of Engineering  
**3.0210** RESPONSE AND ENERGY-DISSIPATION OF REINFORCED CONCRETE FRAMES SUBJECTED TO STRONG BASE MOTIONS
- F.J. GUMPER**, Columbia University, Lamont Doherty Geol. Observ.  
**3.0258** MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE
- I.N. GUPTA**, Univ. of Nevada, School of Mines  
**3.0248** DILATANCY AND PREMONITORY VARIATIONS OF P, S TRAVEL TIMES
- W.J. HALL**, Univ. of Illinois, School of Engineering  
**3.0059** SEISMIC DESIGN OF LOW-RISE BUILDINGS
- B.O. HARDIN**, Univ. of Kentucky, School of Engineering  
**3.0060** SHEAR MODULUS AND DAMPING IN SOILS - MEASUREMENT AND PARAMETER EFFECTS
- B.O. HARDIN**, Univ. of Kentucky, School of Engineering  
**3.0216** SHEAR MODULUS AND DAMPING IN SOILS - DESIGN EQUATIONS AND CURVES
- M.M. HAWKINS**, Univ. of Washington, School of Engineering  
**3.0282** SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS
- J.W. HAYS**, U.S. Dept. of the Interior, Geological Survey  
**3.0164** SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES
- W. HELLER**, U.S. Army, Waterways Experiment Station  
**3.0066** EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS
- J. HOEG**, Stanford University, School of Engineering  
**3.0137** APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING

**RESPONSE OF TALL BUILDINGS**

- R.M. HOLMES**, Oak Ridge National Laboratory  
**3.0271** DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS
- G.W. HOUSNER**, Calif. Inst. of Technology, School of Engineering  
**3.0142** EVALUATION OF THE INCREMENTAL SEISMIC RISK DUE TO RESERVOIR FILLING
- B.F. HOWELL**, Penn. State University, School of Earth Sciences  
**3.0268** SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES
- P.J. HRADILEK**, U.S. Army, Engineer District  
**3.0005** BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971
- D.E. HUDSON**, Calif. Inst. of Technology, School of Engineering  
**3.0042** NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING
- Y.W. ISACHSEN**, State Dept. of Education  
**3.0256** COMPILATION OF BRITTLE STRUCTURES WITHIN NEW YORK STATE
- J.E. ISBELL**, Mass. Inst. of Technology, School of Engineering  
**3.0227** INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES
- W.D. IWAN**, Calif. Inst. of Technology, Graduate School  
**3.0143** THREE-YEAR OPERATION OF THE UNIVERSITIES COUNCIL FOR EARTHQUAKE ENGINEERING RESEARCH
- T. IWASAKI**, Univ. of California, Earthquake Engin. Res. Ctr.  
**3.0003** LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES
- J.G. JACKSON**, U.S. Army, Waterways Experiment Station  
**3.0067** STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS
- P.C. JENNINGS**, Calif. Inst. of Technology, Earthquake Engin. Res. Lab.  
**3.0043** DYNAMICS OF BUILDING - SOIL INTERACTION
- P.C. JENNINGS**, Calif. Inst. of Technology, Earthquake Engin. Res. Lab.  
**3.0144** FORCED VIBRATION OF A 22-STORY STEEL FRAME BUILDING
- M.J. JOHNSTON**, U.S. Dept. of the Interior, Geological Survey  
**3.0117** INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA
- B.G. JONES**, Cornell University, School of Architecture  
**3.0257** LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDINGS

## EARTHQUAKES

INVESTIGATIONS

- ING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS
- P.H. JONES, U.S. Dept. of the Interior, Geological Survey  
A.0243 THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN
- J.N. JORDAN, U.S. Dept. of Commerce, Natl. Ocean Survey  
A.0221 THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967
- W.B. JOYNER, U.S. Dept. of the Interior, Geological Survey  
A.0118 ENGINEERING SEISMOLOGY - CALIFORNIA
- P. JUNGELS, Calif. Inst. of Technology, Seismological Laboratory  
A.0145 STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE
- A.E. KANAAN, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0079 GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES
- M.E. KANE, U.S. Dept. of the Interior, Geological Survey  
A.0174 NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE
- I. KASIRAJ, Univ. of New Mexico, Bureau of Engineering Research  
A.0027 LOW CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES
- M.K. KAUL, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0033 STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES
- E.G. KETHI, Univ. of California, Seismographic Station  
A.0080 SEISMICITY OF MENDOCINO ESCARPMENT GORDA RIDGE REGION - CALIFORNIA
- F. KELLOGG, Mississippi Ark. Tenn. Council  
A.0269 EARTHQUAKE RISK EVALUATION - CRIFFIN DEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE
- J.M. KELLY, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0081 CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFORMATION OF ENGINEERING MATERIALS
- H. KRAWINKLER, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0075 ENGINEERING GEOLOGY RESEARCH STUDIES OF COASTAL COMBINED
- H.S. LAW, U.S. Dept. of Commerce, Building  
A.0055 ENGINEERING ASPECTS OF THE FERNANDO EARTHQUAKE
- C. LAW, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0034 EARTHQUAKE RESPONSE OF TOWER STRUCTURES SURROUNDING
- R.M. LINDVALL, U.S. Dept. of the Interior, Geological Survey  
A.0176 DENVER METROPOLITAN AREA
- L.L. LONG, Georgia Inst. of Technology, Geotechnical Engineering  
A.0202 A STUDY OF MICROARTHRIC SOUTH ATLANTIC UNITED STATES
- J. LYSMEIER, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0084 INFLUENCE OF BASE ISOLATION ON GROUND RESPONSE
- S.A. MAHER, Univ. of California, Earthquake Engin. Res. Ctr.  
A.0094 RAIL OF LOADING OF CRACKED AND REPAIRED CONCRETE MEMBERS
- S.E. MASRI, Univ. of Southern California, Engineering  
A.0048 IMPACT VIBRATION, DAMPED BUSHES
- W.C. MCCAIN, Cal. Poly. Technol. State  
A.0272 EARTHQUAKES - EFFECTS OF SUBGROUND EARTHQUAKE
- E.E. MUELLER, U.S. Dept. of Housing and Urban Development  
A.0021 PERFORMANCE OF 5% DOWELING IN THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971
- D.S. MUELLER, U.S. Dept. of the Interior, Geological Survey  
A.0120 MONTEREY POINT REVENUE OF CALIFORNIA
- D. MCKENZIE, Calif. Inst. of Technology, Laboratory  
A.0146 EUGEN OUSKOWSKIAN RESEARCH AND THE MANTLE STRUCTURE NORTHWESTERN UNITED STATES
- W.A. MURPHY, U.S. Dept. of the Interior, Geological Survey  
A.0075 ENGINEERING GEOLOGY RESEARCH STUDIES OF COASTAL COMBINED

**T. MINAMI**, Univ. of California, Earthquake Engin. Res. Ctr.  
**3.0085 ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS**

**J.R. MURPHY**, Environmental Res. Corporation  
**3.0244 PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA- GLENDALE AREA**

**R.D. NASON**, U.S. Dept. of Commerce, Earthquake Mechanism Lab.  
**3.0155 MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT**

**A. NECIOGLU**, St. Louis University, Graduate School  
**3.0235 SOME GROUND MOTION AND INTENSITY RELATIONS FOR THE CENTRAL UNITED STATES**

**W.H. NELSON**, John A. Blume & Associates  
**3.0015 OBSERVATIONS OF DAMAGE TO GLENDALE SWIMMING POOLS, MOBILE HOMES, AND COMMERCIAL BUILDINGS RESULTING FROM SAN FERNANDO EARTHQUAKE OF 1971**

**D.R. NICHOLS**, U.S. Dept. of the Interior, Geological Survey  
**3.0197 SEISMIC HAZARDS AND LAND-USE PLANNING**

**T.C. NICHOLS**, U.S. Dept. of the Interior, Geological Survey  
**3.0177 V. A. HOSPITAL SITE EVALUATIONS**

**E.F. NORDLIN**, State Materials & Res. Dept.  
**3.0152 ELASTOMERIC ENERGY ABSORBER**

**A. NUR**, Stanford University, School of Earth Sciences  
**3.0138 STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA**

**O.W. NUTTLI**, U.S. Army, Waterways Experiment Station  
**3.0233 STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT 1.**

**O.W. NUTTLI**, St. Louis University, Graduate School  
**3.0236 A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE**

**O.W. NUTTLI**, St. Louis University, Graduate School  
**3.0237 MAGNITUDE RECURRENCE RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES**

**O.W. NUTTLI**, St. Louis University, Graduate School  
**3.0238 THE RELATION BETWEEN FELT AREA AND MAGNITUDE FOR CENTRAL UNITED STATES EARTHQUAKES**

**O.W. NUTTLI**, St. Louis University, School of Engineering  
**3.0239 TRAVEL-TIME TABLES FOR EARTHQUAKES IN THE CENTRAL UNITED STATES**

**P.P. ORKILD**, U.S. Dept. of the Interior, Geological Survey  
**3.0180 TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL EXPERIMENT - CALIFORNIA, NEVADA, UTAH**

**T.L. PAEZ**, Purdue University, School of Civil Engin.  
**3.0215 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES**

**R. PAGE**, Columbia University, Lamont Doherty Geolog. Observ.  
**3.0259 MEASUREMENTS FOR FAULT SLIP ON THE DENALI, FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS, ALASKA**

**E.H. PAMPEYAN**, U.S. Dept. of the Interior, Geological Survey  
**3.0121 PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA**

**PENZIEN**, Univ. of California, School of Engineering  
**3.0086 INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES**

**J. PENZIEN**, Univ. of California, School of Engineering  
**3.0087 THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS**

**D.W. PETERSON**, U.S. Dept. of the Interior, Geological Survey  
**3.0057 HAWAIIAN VOLCANO OBSERVATORY**

**G. PLAFKER**, U.S. Dept. of the Interior, Geological Survey  
**3.0122 ALASKA GEOLOGIC EARTHQUAKE HAZARDS**

**E.P. POPOV**, Univ. of California, Earthquake Engin. Res. Ctr.  
**3.0088 CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR**

**E.P. POPOV**, Univ. of California, Earthquake Engin. Res. Ctr.  
**3.0089 CYCLIC LOADING OF FULL-SIZE CONNECTIONS**

**J.D. PRENDERGAST**, U.S. Army, Construction Engin. Res. Lab.  
**3.0203 EARTHQUAKE EFFECTS ON STRUCTURES**

**R.H. PRY SOCK**, State Materials & Res. Dept.  
**3.0012 THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE**

**C.B. RALEIGH**, U.S. Dept. of the Interior, Geological Survey  
**3.0123 RANGELY - CALIFORNIA**

**D. RAY**, Univ. of California, Earthquake Engin. Res. Ctr.

# EARTHQUAKES

W.F. REPS, U.S. Dept. of Commerce, Center For Building Technology

3.0191 DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS

S.L. ROBBINS, U.S. Dept. of the Interior, Geological Survey

3.0124 REGIONAL AND DETAIL'D GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS, CALIFORNIA

ROBINSON, F.T. Research Institute

3.0204 TECHNIQUES FOR RETROFITTING EXISTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE

E.C. RODABAUGH, Battelle Memorial Institute

3.0265 SURVEY REPORT ON STRUCTURAL DESIGN OF PIPING SYSTEMS AND COMPONENTS

L.H. ROEHM, U.S. Dept. of the Interior, Bureau of Reclamation

3.0053 COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTELEONE DAM

J.M. ROESSET, Mass. Inst. of Technology, School of Engineering

3.0228 NONLINEAR AND COUPLED SEISMIC EFFECTS

T.H. ROGERS, U.S. Dept. of Commerce, Earthquake Mechanism Lab

3.0156 ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLISTER, CALIFORNIA

J.C. ROLLER, U.S. Dept. of the Interior, Geological Survey

3.0125 SPECIAL MICRO-EARTHQUAKE NETWORKS, ALABAMA AND TEXAS

A. RYALL, Univ. of Nevada, School of Mines

3.0249 SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICRO-EARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA

A. RYALL, Univ. of Nevada, School of Mines

3.0250 EARTHQUAKE DISTRIBUTION AND MECHANISM OF FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VALLEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA

J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey

3.0126 STRAIN STUDIES, CALIFORNIA, NEVADA, MONTANA

J.C. SAVAGE, U.S. Dept. of the Interior, Geological Survey

3.0127 CRUSTAL STRAIN, CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO

A.J. SCHIFF, Purdue University, School of Aeronautics

3.0023 RESPONSE OF POWER SYSTEMS TO THE SAN FERNANDO VALLEY EARTHQUAKE OF 21 FEBRUARY 1971

INVESTIGATION

P.B. SCHNABEL, Univ. of California, Earthquake

3.0035 SHAKE-A-A COMPUTER PROGRAM FOR EARTHQUAKE RESPONSE ANALYSIS OF LAYERED SOILS

P.B. SCHNABEL, Univ. of California, Earthquake

3.0092 ACCELERATIONS IN EARTHQUAKES IN THE WESTERN UNITED STATES

P.B. SCHNABEL, Univ. of California, Earthquake

3.0093 MODIFICATION OF SEISMOGRAPHIC RECORDS OF LOCAL SOIL CONDITIONS

R.E. SCHOLT, John A. Blum & Associates

3.0016 SEISMIC MOTION DAMAGE POTENTIAL FOR LOW-RISE BUILDINGS, COLORADO

C.H. SCHOLZ, Columbia University, Earthquake

3.0260 EXPERIMENTAL AND THEORETICAL STUDIES OF THE DEFORMATION OF EARTHQUAKE PRECURSORS

H.B. SEED, Univ. of California, Dept. of Earthquake

3.0094 EFFECTS OF SOIL CONDITION ON SEISMIC MOTION DURING EARTHQUAKES, CALIFORNIA

H.B. SEED, Univ. of California, Earthquake

3.0095 ANALYSIS OF THE SEISMICITY IN THE SAN ANDREAS FAULT, CALIFORNIA, FEBRUARY 9, 1971

H.B. SEED, Univ. of California, Earthquake

3.0096 SOIL MODULI AND DAMPING COEFFICIENTS FOR DYNAMIC RESPONSE ANALYSIS

H.B. SEED, Univ. of California, Earthquake

3.0097 A SIMPLIFIED PROCEDURE FOR ESTIMATING SOIL EFFECTS ON POTENTIAL

J.B. SEED, Calif. Inst. of Technology, Geotechnical

3.0044 GENERAL REVIEW OF THE SEISMICITY OF THE SAN ANDREAS FAULT

H.C. SHAL, Stanford University, School of Earth

3.0040 MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS

K.S. SKAUFUM, Calif. Inst. of Technology, Earth

3.0048 DYNAMIC ANALYSIS OF COILS AND SANDWICH BEAMS

B. SKIPP, U.S. Dept. of the Interior, Geological

3.0182 SNAKE RIVER BASIN, PART I: PART NORTHWEST MARGIN, IDAHO

- P.D. SNAVELY**, U.S. Dept. of the Interior, Geological Survey  
**3.0128 EARTHQUAKE HAZARDS REDUCTION-- NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON**
- M.A. SOZEN**, Univ. of Illinois, School of Engineering  
**3.0211 EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS**
- M.A. SOZEN**, Univ. of Illinois, School of Engineering  
**3.0212 EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE-RESISTANT DESIGN (ABBREV)**
- W. STAUDER**, St. Louis University, School of Arts  
**3.0240 RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI**
- W. STAUDER**, St. Louis University, School of Engineering  
**3.0241 SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968**
- K.V. STEINBRUGGE**, U.S. Dept. of Commerce, Natl. Ocean Survey  
**3.0002 STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A**
- K.V. STEINBRUGGE**, U.S. Dept. of Commerce, Natl. Ocean Survey  
**3.0025 THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969**
- K.V. STEINBRUGGE**, State Legislature  
**3.0150 MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY**
- K.V. STEINBRUGGE**, U.S. Exec. Office of the Pres., Off. of Science & Technology  
**3.0200 REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES**
- J.W. STEWART**, U.S. Dept. of the Interior, Geological Survey  
**3.0129 AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA**
- C.H. STOKOE**, Univ. of Texas, Graduate School  
**3.0273 INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE**
- J.L. STREETER**, Univ. of Michigan, School of Engineering  
**3.0231 EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS**
- J.R. SYKES**, Columbia University, Lamont Doherty Geol. Observ.  
**3.0261 SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES**
- A. SYLVESTER**, Univ. of California, School of Letters  
**3.0157 AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA**
- J. TAGGART**, U.S. Dept. of the Interior, Geological Survey  
**3.0167 SEISMICITY AND EARTH STRUCTURE**
- S.K. TAKAHASHI**, U.S. Navy, Civil Engineering Lab.  
**3.0007 PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973**
- G. TALEBAGHA**, Mass. Inst. of Technology, School of Engineering  
**3.0062 SENSITIVITY ANALYSES AND GRAPHICAL METHOD FOR PRELIMINARY SOLUTIONS**
- J. TANG**, Univ. of New Mexico, Bureau of Engineering Research  
**3.0251 PROBABILITY OF FATIGUE FAILURE UNDER EARTHQUAKE LOADS**
- A.C. TARR**, U.S. Dept. of the Interior, Geological Survey  
**3.0051 NATIONAL EARTHQUAKE INFORMATION SERVICE**
- A.C. TARR**, U.S. Dept. of the Interior, Geological Survey  
**3.0168 SOUTH CAROLINA SEISMICITY PROGRAM**
- A.C. TARR**, U.S. Dept. of Commerce, Natl. Ocean Survey  
**3.0222 IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES**
- T. TENG**, Univ. of Southern California, School of Letters  
**3.0104 MICROEARTHQUAKE MONITORING IN LOS ANGELES AREA**
- W. THATCHER**, U.S. Dept. of the Interior, Geological Survey  
**3.0130 SEISMIC SOURCE STUDIES - CALIFORNIA**
- D.A. TIEDEMANN**, U.S. Dept. of the Interior, Bureau of Reclamation  
**3.0183 EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE**
- F.C. TOWNSEND**, U.S. Army, Waterways Experiment Station  
**3.0234 LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING**
- M.D. TRIFUNAC**, Calif. Inst. of Technology, School of Engineering  
**3.0147 A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA**
- W. TSENG**, Univ. of California, Earthquake Engin. Res. Ctr.  
**3.0098 ANALYTICAL INVESTIGATIONS OF THE SEISMIC RESPONSE OF LONG MULTIPLE SPAN HIGHWAY BRIDGES**
- UNKNOWN**, Calif. Inst. of Technology, Center For Res. Prev. Disaster  
**3.0001 EARTHQUAKES AND INSURANCE**



## EARTHQUAKES

UNKNOWN, State Div. of Mines & Geology

- 3.0011 URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

UNKNOWN, John A. Blume & Associates

- 3.0017 DAMAGE SURVEY, SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971

UNKNOWN, John A. Blume & Associates

- 3.0018 STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA EARTHQUAKE OF JUNE 21, 1967

UNKNOWN, Natl. Res. Council

- 3.0054 EARTHQUAKES RELATED TO RESERVOIR FILLING

UNKNOWN, Mississippi Ark. Tenn. Council

- 3.0069 REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL REPORT

UNKNOWN, Univ. of Alaska, Geophysical Institute

- 3.0072 INSTALLATION AND OPERATION OF A TELEMETERED SEISMIC NETWORK ON THE ALASKA PENINSULA

UNKNOWN, Los Angeles Co. Bd. of Supvrs.

- 3.0101 RECOMMENDATIONS DEVELOPED FROM REPORTS OF THE EARTHQUAKE COMMISSION AND EARTHQUAKE TASK FORCES - SAN FERNANDO EARTHQUAKE (ABBREV)

UNKNOWN, State Legislature

- 3.0151 THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY

UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0161 A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS

UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0162 A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA

UNKNOWN, Natl. Acad. of Sciences

- 3.0186 TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES

UNKNOWN, U.S. Army

- 3.0187 SEISMIC DESIGN FOR BUILDINGS

UNKNOWN, U.S. Dept. of Hou. & Urb. Dev., Fed. Insurance Administration

- 3.0196 REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

- 3.0198 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY

## INVESTIGATOR/AUTHOR

UNKNOWN, U.S. Veterans Administration, Hospitals Clinics & Reg. Off.

- 3.0201 EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES

UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0223 ALEUTIAN SEISMIC PROGRAM SEISMOLOGICAL BULLETIN, MARCH 1972

UNKNOWN, U.S. Dept. of Commerce, Environ. Research Laboratories

- 3.0224 ALEUTIAN SEISMIC PROGRAM - SEISMOLOGICAL BULLETIN, MARCH 1971

UNKNOWN, U.S. Army, Engineer District

- 3.0242 MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

- 3.0247 ALEUTIAN SEISMIC PROGRAM HYPOCENTER SUMMARY, OCTOBER 1972-APRIL 1973

UNKNOWN, U.S. Army, Engineer District

- 3.0267 LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON

UNKNOWN, Mississippi Ark. Tenn. Council

- 3.0270 REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA

UNKNOWN, Shannon & Wilson Incorporated

- 3.0278 SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS

UNKNOWN, Unknown Inst. or Indiv. Grant

- 3.0284 DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING

A.K. VAISH, Univ. of California, Earthquake Engin. Res. Ctr.

- 3.0036 EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS

R. VONHUENE, U.S. Dept. of the Interior, Geological Survey

- 3.0131 TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA

H.C. WAGNER, U.S. Dept. of the Interior, Geological Survey

- 3.0132 ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA

R.E. WALLACE, U.S. Dept. of the Interior, Geological Survey

- 3.0133 TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA

S.H. WARD, Univ. of Utah, School of Mines

- 3.0276 REGIONAL SEISMICITY AND TECTONICS OF THE SOUTHERN INTERMOUNTAIN SEISMIC BELT WITH EMPHASIS ON THE WASATCH FRONT - UTAH

J.D. WELLS, U.S. Dept. of the Interior, Geological Survey

- 3.0184 HAMILTON 2 DEGREE

Y.K. WEN, Univ. of Illinois, School of Engineering

R.L. WESSON, U.S. Dept. of the Interior, Geological Survey  
3.0135 CENTRAL CALIFORNIA SEISMICITY STUDIES - CALIFORNIA

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering  
3.0026 DAMAGE STATISTICS FOR HIGH-RISE BUILDINGS IN THE VICINITY OF THE SAN FERNANDO EARTHQUAKE

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering  
3.0063 DAMAGE PROBABILITY MATRICES FOR PROTOTYPE BUILDINGS

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering  
3.0064 SUMMARY OF METHODOLOGY AND PILOT APPLICATION

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering  
3.0229 SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS

R.V. WHITMAN, Mass. Inst. of Technology, School of Engineering  
3.0230 METHODOLOGY AND PILOT APPLICATION

J.H. WIGGINS, John H. Wiggins Company  
3.0008 COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION

J.H. WIGGINS, John H. Wiggins Company  
3.0009 BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH

J.K. WIGHT, Univ. of Illinois, School of Engineering  
3.0214 SHEAR STRENGTH DECAY IN REINFORCED CONCRETE COLUMNS SUBJECTED TO LARGE DEFLECTION REVERSALS

P.L. WILLIAMS, U.S. Dept. of the Interior, Geological Survey  
3.0185 SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO

E.L. WILSON, Univ. of California, Earthquake Engin. Res. Ctr.  
3.0099 STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS

P.H. WIRSCHING, Univ. of New Mexico, Bureau of Engineering Research  
3.0252 A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING

J.H. WOOD, Calif. Inst. of Technology, Earthquake Engin. Res. Lab.  
3.0148 ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE

M. WYSS, Columbia University, Lamont Doherty Geolog. Observ.

3.0263 TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS

J.T. YAO, Univ. of New Mexico, Bureau of Engineering Research  
3.0253 ADAPTIVE STRUCTURAL SYSTEMS

J.T. YAO, Univ. of New Mexico, Graduate School  
3.0254 SEISMIC DESIGN OF BUILDING STRUCTURES

R.S. YEATS, Ohio University, School of Arts  
3.0264 AGE, GEOMETRY, AND STRESS FIELDS OF FOUR MAJOR FAULTS OF THE CALIFORNIA TRANSVERSE RANGES BY EVALUATION OF WELL DATA

H.Y. YEH, Univ. of New Mexico, Bureau of Engineering Research  
3.0255 DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL SYSTEMS

H.Y. YEH, Texas A & M University System, School of Engineering  
3.0274 THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE

R.F. YERKES, U.S. Dept. of the Interior, Geological Survey  
3.0006 VAN NORMAN RESERVOIRS AREA, CALIFORNIA

F.Y. YOKEL, U.S. Dept. of Commerce, Natl. Bureau of Standards  
3.0193 EARTHQUAKE DESIGN FOR MASONRY STRUCTURES

F.Y. YOKEL, U.S. Dept. of Commerce, Natl. Bureau of Standards  
3.0194 DESIGN CRITERIA FOR MASONRY

F.Y. YOKEL, U.S. Dept. of Commerce, Building Research Div.  
3.0195 FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD

## EXPANSIVE SOILS

J.T. ALFORE, State Div. of Mines & Geology  
4.0001 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

B.W. BROWN, Univ. of Southern Mississippi, School of Science  
4.0009 MAPPING OF SURFACE MATERIALS FOR PREDICTING FOUNDATION CHARACTERISTICS IN FUTURE DEVELOPMENT OF HATTIESBURG

J.M. CATTERMOLE, U.S. Dept. of the Interior, Geological Survey  
4.0004 GEOLOGY OF THE RAPID CITY AREA, SOUTH

## EXPANSIVE SOILS

- L.D. JOHNSON, U.S. Army, Waterways Experiment Station  
4.0002 INFLUENCE OF NEGATIVE PORE PRESSURE  
DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE  
TO MILITARY FACILITIES (ABBREV)
- L.D. JOHNSON, U.S. Army, Waterways Experiment Station  
4.0003 REVIEW OF LITERATURE ON EXPANSIVE  
CLAY SOILS
- R.D. MILLER, U.S. Dept. of the Interior, Geological Survey  
4.0006 SURFICIAL GEOLOGY OF JUNEAU AND  
VICINITY URBAN AREA, ALASKA
- D. RICHARD, Univ. of Denver, Graduate School  
4.0008 UNIVERSITY-INDUSTRY WORKSHOP ON  
HAZARDS AND DAMAGE RELATED TO EXPANSIVE  
EARTH MATERIALS
- R.D. RICHMOND, U.S. Dept. of the Interior, Bureau of Recla-  
mation  
4.0007 STABILIZATION OF EXPANSIVE CLAYS AND  
SHALES

## FOREST & GRASS FIRES

- J.T. ALFORE, State Div. of Mines & Geology  
5.0026 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)
- R.S. ALGER, U.S. Navy, Ordnance Laboratory  
5.0012 THE GREAT OAKLAND, LOS ANGELES, AND  
SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970
- H.E. ANDERSON, U.S. Dept. of Agriculture, Intermtn. For. &  
Rg. Expt. Sta.  
5.0018 PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL  
PROPERTIES OF FUELS RELATED TO FIRE  
PHENOMENA
- C.J. AUVIL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg.  
Expt. Sta.  
5.0033 FIRE ENVIRONMENTAL TEST CHAMBER - ITS  
DESIGN AND DEVELOPMENT
- R.G. BAUGHMAN, U.S. Dept. of Agriculture, Intermtn. For. &  
Rg. Expt. Sta.  
5.0019 METHODS FOR THE PREVENTION AND CON-  
TROL OF LIGHTNING FIRES
- G.C. BERNARDI, U.S. Dept. of Agriculture, Pac. Sw. For. &  
Rg. Expt. Sta.  
5.0034 FIRES CAUSED BY EQUIPMENT USED DURING  
CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 -  
1971

V.I. BINENKO, U.S. Air Force, Foreign Technology Division

## INVESTIGATOR/

- J.R. CHRISTIANSEN, U.S. Dept. of Agriculture, Pac.  
& Rg. Expt. Sta.  
5.0036 CHARACTERISTICS OF PEOPLE WHO  
FIRES ... SOME PRELIMINARY FINDINGS - C  
NIA
- D.W. COLE, Univ. of Washington, School of Forestry  
5.0047 FIRE ON A FOREST SOIL
- R.W. COOPER, U.S. Dept. of Agriculture, S.E. Fore  
ment Station  
5.0042 DEVELOPMENT OF IMPROVED TECH  
FOR USING PRESCRIBED FIRE IN SO  
FORESTS
- G.E. COPELAND, Old Dominion University, Graduate  
5.0032 CORRELATION OF SATELLITE AND  
DATA IN AIR POLLUTION STUDIES (ABBRE
- R.C. CORLETT, Univ. of Washington, School of Engi  
5.0024 MECHANISMS OF WILDLAND FIRE S  
SION
- C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac.  
& Rg. Expt. Sta.  
5.0003 PHYSICAL CHARACTERISTICS OF C  
AS A WILDLAND FUEL - CALIFORNIA
- C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac.  
& Rg. Expt. Sta.  
5.0004 FIRE WEATHER AND FIRE BEHAVIOR  
1968 CANYON FIRE - CALIFORNIA
- C.M. COUNTRYMAN, U.S. Dept. of Agriculture, Pac.  
For. & Rg. Expt. Sta.  
5.0006 FOREST FIRE BEHAVIOR - CALIFORNIA
- F.N. DAVID, Univ. of California, School of Agriculture  
5.0041 FOREST FIRE STATISTICAL PROBLEM
- J.B. DAVIS, U.S. Dept. of Agriculture, Pac. S.W. For.  
Expt. Sta.  
5.0007 FIRE MANAGEMENT SYSTEMS
- J.D. DELL, U.S. Dept. of Agriculture, Pac. Sw. For.  
Expt. Sta.  
5.0037 REDUCING FIRE HAZARD IN PON  
PINE THINNING SLASH BY MECHANICAL  
ING - OREGON
- W.A. DEUTSCHMAN, Smithsonian Institution  
5.0013 STUDIES OF IMAGES OF SHOR  
EVENTS USING ERTS DATA - ALASKA
- M.L. DOOLITTLE, Mississippi St. University, U.S.  
Forest Expt. Sta.  
5.0017 RESEARCH AND DEVELOPMENT O  
PREVENTION TECHNOLOGY (FIRE PREVEN
- L.E. DUNKELBERGER, U.S. Dept. of Agriculture, Pac.

EN, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Sta.  
GUIDES FOR FUEL-BREAKS IN THE SIERRA MADRA MIXED-CONIFER TYPE

ISAMORE, Natl. Acad. of Sciences  
CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH

INES, U.S. Dept. of Agriculture, North Cen. Forest Sta.  
FOREST FIRES IN MISSOURI

INES, U.S. Dept. of Agriculture, North Cen. Forest Sta.  
FIRE WHIRLWIND FORMATION OVER FLAT RAIN

RDY, U.S. Dept. of Agriculture, Intermt. For. & Rg. Sta.  
CONTROL AND USE OF FIRE PARTICULARLY WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS

SCH, U.S. Dept. of Agriculture, Intermt. For. & Rg. Sta.  
FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES

IANSEN, U.S. Dept. of Agriculture, S.E. Forest Experiment Station  
DEVELOPMENT OF NEW AND IMPROVED CONTROL METHODS FOR SOUTHERN PESTS

NSON, Michigan State University, U.S.D.A. N. Cen. Ex. Sta.  
FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES

UPP, U.S. Dept. of Commerce, Natl. Weather Service  
OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA

JEGER, U.S. Dept. of Commerce, Natl. Weather Service  
RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION

CASTER, Colorado State University, U.S.D.A. Rocky Mtn. For. Sta.  
NATIONAL FIRE DANGER RATING

NDENMUTH, Northern Ariz. University, U.S.D.A. Mtn. Forest Sta.  
PRESCRIBED FIRE TECHNOLOGY FOR THE WEST

ES, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Sta.  
FOREST FIRE HISTORY - A COMPUTER

R.W. SANDO, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta.  
5.0016 FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA

M.J. SCHROEDER, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Exp. Sta.  
5.0040 FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION

P.G. SCOWCROFT, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta.  
5.0039 PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL

UNKNOWN, Natl. Acad. of Sciences  
5.0009 EMPLOYMENT OF AIR OPERATIONS IN THE FIRE SERVICES - PROCEEDINGS OF A SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREVIATED)

UNKNOWN, U.S. Dept. of Agriculture, Div. of Administrative Mgmt.  
5.0010 A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I - SUMMARY - MAIN STUDY RECOMMENDATIONS AND FINDINGS

R.H. WHITTAKER, Cornell University, School of Biological Sciences  
5.0021 A MODEL OF THE FORESTS OF GLACIER NATIONAL PARK, MONTANA

D.T. WILLIAMS, U.S. Dept. of Agriculture, S.E. Forest Experiment Station  
5.0043 THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH

R.A. WILSON, U.S. Dept. of Agriculture, Northern Forest Fire Lab.  
5.0028 AIRBORNE INFRARED FOREST FIRE DETECTION SYSTEM

H.A. WRIGHT, Texas Technological University, School of Agriculture  
5.0022 EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS

G. YAMATE, IIT Research Institute  
5.0044 DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS

## FLOODS

P. AKLILU, Univ. of Massachusetts, Water Resources Research Ctr.  
6.0105 FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN

D.J. ALLEE, Cornell University, Water Resou. & Marine Sc. Ctr.

6.0334 REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I

D.J. ALLEE, State University of New York, Agricultural Experiment Sta.

6.0336 THE POLITICAL ECONOMY OF WATER RESOURCES

W. ANDERSON, U.S. Dept. of the Interior, Geological Survey

6.0230 GEOHYDROLOGIC CONDITIONS AND FLOOD POTENTIALS IN THE SINK AREAS OF SOUTH WESTERN SEMINOLE COUNTY, FLORIDA

W.D. ANDERSON, U.S. Dept. of Agriculture, Natural Resource Econ. Div.

6.0194 ANALYSIS OF LAND USE CONTROL MEASURES

W.H. ANDREWS, Utah State University, School of Social Science

6.0153 MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III

W.H. ANDREWS, Utah State University, Inst. For Social Science Res.

6.0390 DEFINING THE ELEMENTS OF THE SOCIOLOGICAL SYSTEM RELATED TO DRAINAGE PROBLEMS OF URBAN AREAS

D.G. AREY, Univ. of Pittsburgh, Graduate School

6.0359 ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS

N.V. ARVANITIDIS, I N T A S A Incorporated

6.0173 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART II - MODEL DESCRIPTION AND APPLICATIONS

N.V. ARVANITIDIS, I N T A S A Incorporated

6.0174 COMPUTER SIMULATION MODEL FOR FLOOD PLAIN DEVELOPMENT - PART I - LAND USE PLANNING AND BENEFIT EVALUATION

L. BAJORUNAS, U.S. Dept. of Commerce, Limnology Division

6.0207 LAKE HYDROLOGY

P.J. BARLOW, State Comm. & Area Dev. Div.

6.0309 ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI

J.R. BARNARD, Univ. of Iowa, School of Liberal Arts

6.0018 URBAN GROWTH, RUNOFF, EXTERNALITIES, AND INCOME DISTRIBUTION EFFECTS IN RALSTON CREEK WATERSHEDS

J.R. BARNARD, Iowa State University, Water Resources Research Inst.

6.0272 ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE

C. BARRIENTOS, U.S. Dept. of Commerce, National Weather Service

6.0005 FLOOD INSURANCE STUDY

D.R. BASCO, Texas A & M University System, School of Engineering

6.0151 ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT--A CASE STUDY - TEXAS

L.R. BEARD, U.S. Army, Hydrologic Engineering Center

6.0037 HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES

L.R. BEARD, Univ. of Texas, Ctr. Res. in Water Resources

6.0378 TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING

L.A. BENSON, South Dakota State University, Remote Sensing Institute

6.0030 MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY

F.A. BERTLE, U.S. Dept. of the Interior, Bureau of Reclamation

6.0183 FLOOD HYDROLOGY INVESTIGATIONS

J. BLACKWELL, State Dept. of Community Affs.

6.0295 RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969

J.W. BOARD, U.S. Dept. of the Interior, Geological Survey

6.0372 URBAN HYDROLOGY STUDY - AUSTIN, TEXAS

J.D. BOHN, U.S. Dept. of the Interior, Geological Survey

6.0373 URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN

C.E. BOWERS, Univ. of Minnesota, St. Anthony Falls Hydr. Lab.

6.0113 FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS

E.F. BRATER, Univ. of Michigan, School of Engineering

6.0112 RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS

E.F. BRATER, Univ. of Michigan, School of Engineering

6.0299 PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN

J.P. BREADEN, Univ. of Kentucky, Water Resources Institute

6.0019 THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES

W.C. BRIDGES, U.S. Dept. of the Interior, Geological Survey

6.0233 MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA

M.L. BROWN, U.S. Dept. of the Interior, Geological Survey

6.0164 APPLICATIONS OF AERIAL MEASUREMENTS TECHNIQUES

R.J. BURDGE, Univ. of Kentucky, Water Resources Institute

6.0004 FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT

USBY, U.S. Dept. of the Interior, Geological Survey  
EFFECTS OF URBAN DEVELOPMENT AND  
TER USE ON THE SANTA ANA RIVER, CALIFOR-

USBY, U.S. Dept. of the Interior, Geological Survey  
PERRIS VALLEY URBAN HYDROLOGY STUDY  
CALIFORNIA

TCHEER, Univ. of Texas, School of Engineering  
OPTIMAL FLOOD ROUTING USING  
CHASTIC DYNAMIC PROGRAMMING

MP, U.S. Dept. of the Interior, Geological Survey  
FLOOD FLOWS FROM SMALL DRAINAGE  
BASINS

MP, U.S. Dept. of the Interior, Geological Survey  
DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS

RLSON, Univ. of Alaska, Inst. of Water Resources  
DEVELOPMENT OF AN ALASKAN CONCEPTUAL  
WATERSHED MODEL

RNS, U.S. Dept. of the Interior, Geological Survey  
FLOOD FREQUENCY STUDY ILLINOIS

IG, Unknown Inst. or Individ. Grant  
REVIEW EMERGENCY RELIEF FILES AND  
VEY THE TREND OF BRIDGE LOSSES DURING  
ARM CONDITIONS

ANG, Fed. City College, Graduate School  
A STATISTICAL SUMMARY OF THE CAUSE  
D COST OF BRIDGE FAILURES

ANG, Purdue University, Water Resources Research

INITIAL RESULTS FROM THE UPPER WABASH  
ULATION MODEL

ATHAM, U.S. Army, Waterways Experiment Station  
DESIGN FOR FLOOD CONTROL AND WAVE  
TECTION, CHAGRIN RIVER, EASTLAKE, OHIO -  
DRAULIC MODEL INVESTIGATION

EATHAM, Mississippi St. University, Graduate School  
CASE STUDY OF ECONOMIC ASPECTS OF THE  
ERAL FLOOD INSURANCE PROGRAM

OW, Univ. of Illinois, School of Engineering  
EVALUATION OF FLOOD RISKS

URCHILL, Illinois Inst. For Envir. Qlty  
DEVELOPMENT OF A FLOOD AND POLLU-  
TION CONTROL PLAN FOR THE CHICAGOLAND  
AREA - COMPUTER SIMULATION PROGRAMS

ARK, Ohio State University, School of Engineering  
COST-EFFECTIVENESS ANALYSES OF RE-  
GIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES

ARK, Ohio State University, School of Engineering

H. COHEN, Univ. of Alabama, Natural Resources Center  
6.0162 LAND-USE REGULATIONS IN FLOOD-PRONE  
AREAS - A SUMMARY OF THE WISCONSIN STUDY  
AND AN ANALYSIS OF ALABAMA LAND-USE LAW

D.C. CONGER, U.S. Dept. of the Interior, Geological Survey  
6.0407 REGIONAL FLOOD-FREQUENCY STUDY  
(PHASE II)

L.C. CONN, U.S. Dept. of the Interior, Geological Survey  
6.0370 FLOODING OF SMALL STREAMS IN NASH-  
VILLE-DAVIDSON COUNTY AREA, TENNESSEE

D.N. CONTRACTOR, Virginia Polytechnic Institute, School of  
Engineering  
6.0396 NUMERICAL STUDIES OF UNSTEADY FLOW  
IN THE JAMES RIVER - VIRGINIA

COOK, U.S. Dept. of the Interior, Geological Survey  
6.0208 HYDROLOGIC STUDY OF SMALL RURAL  
WATERSHEDS - INDIANA

R.B. COROTIS, Northwestern University, School of Technol-  
ogy  
6.0259 RESEARCH INITIATION - A MULTIDIMEN-  
SIONAL STOCHASTIC MODEL FOR FLOOD PREDIC-  
TION

D.C. COX, Univ. of Hawaii, School of Arts  
6.0252 HAWAII ENVIRONMENTAL SIMULATION  
MODEL

O.A. CROSBY, U.S. Dept. of the Interior, Geological Survey  
6.0138 MAGNITUDE AND FREQUENCY OF FLOOD  
DISCHARGES FROM SMALL DRAINAGE BASINS, EF-  
FECTS OF DRAINAGE BASIN CHARACTERISTICS -  
NORTH DAKOTA

O.A. CROSBY, U.S. Dept. of the Interior, Geological Survey  
6.0344 MAGNITUDE AND FREQUENCY OF FLOODS  
ON SMALL STREAMS - NORTH DAKOTA

W.P. CROSS, U.S. Dept. of the Interior, Geological Survey  
6.0059 INVESTIGATION AND ANALYSIS OF FLOODS  
FROM SMALL DRAINAGE AREAS IN OHIO

C.G. CULVER, U.S. Dept. of Commerce, Natl. Bureau of Stan-  
dards  
6.0001 DISASTER INVESTIGATIONS

J.E. CUMMANS, U.S. Dept. of the Interior, Geological Survey  
6.0403 FLOOD PROFILES AND INUNDATED AREAS  
ALONG THE LOWER NISQUALLY RIVER, WASHING-  
TON

J.E. CUMMANS, U.S. Dept. of the Interior, Geological Survey  
6.0404 FLOOD PROFILES AND INUNDATED AREAS  
ALONG THE SKOKOMISH RIVER, WASHINGTON

A.B. CUNNINGHAM, Univ. of Nevada, Desert Research In-  
stitute  
6.0322 EVALUATION OF FLOOD PEAK PREDICTION  
METHODS IN SEMI-ARID REGIONS IN RELATION TO  
DAM SAFETY

**J.W. DELLEUR**, Purdue University, School of Engineering

6.0270 THE EFFECT OF URBANIZATION ON  
HYDROLOGY OF WATERSHEDS - INDIANA

**G.R. DEMPSTER**, U.S. Dept. of the Interior, Geological Survey

6.0374 EFFECTS OF URBANIZATION ON FLOODS IN  
THE DALLAS, TEXAS METROPOLITAN AREA

**G.R. DEMPSTER**, U.S. Dept. of the Interior, Geological Survey

6.0382 URBAN HYDROLOGY STUDY, DALLAS,  
TEXAS

**W.H. DICKERSON**, West Va. University, Water Research In-  
stitute

6.0406 STORM CHARACTERISTICS AND RAINFALL  
INTENSITY IN WEST VIRGINIA

**E.R. DODGE**, Montana State University, School of Engineering

6.0125 APPLICATION OF HYDROLOGIC AND  
HYDRAULIC RESEARCH TO CULVERT SELECTION  
IN MONTANA - VOLUME I - REPORT

**G.L. DUCRET**, U.S. Dept. of the Interior, Geological Survey

6.0048 FLOOD FREQUENCY IN URBAN AREAS,  
COLORADO

**G.L. DUCRET**, U.S. Dept. of the Interior, Geological Survey

6.0049 PEAK DISCHARGE AND FREQUENCY FOR  
SMALL WATERSHEDS IN COLORADO

**B. DUNN**, U.S. Dept. of the Interior, Geological Survey

6.0331 FLOOD INVESTIGATIONS - NEW YORK

**W.H. EDDINS**, U.S. Dept. of the Interior, Geological Survey

6.0342 EFFECTS OF URBANIZATION ON FLOODS IN  
CHARLOTTE, NORTH CAROLINA

**D.T. EDSON**, U.S. Dept. of the Interior, Geological Survey

6.0209 INVESTIGATION OF ERTS-A IMAGES FOR AP-  
PLICATION TO THEMATIC MAPPING, MISSISSIPPI  
RIVER

**B.S. EICHERT**, U.S. Army, Hydrologic Engineering Center

6.0038 RESERVOIR SYSTEMS ANALYSIS FOR FLOOD  
CONTROL

**J.A. ELLIOTT**, Diversified Consultants Inc.

6.0307 URBAN SYSTEMS - STORM DRAINAGE &  
FLOOD PLAIN MANAGEMENT, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT (AB-  
BREV)

**J.A. ELLIOTT**, Diversified Consultants Inc.

6.0308 URBAN SYSTEMS - WATERWORKS, SANITARY  
SEWERAGE, SOLID WASTE MANAGEMENT, STORM  
DRAINAGE & FLOOD PLAIN MANAGEMENT (AB-  
BREV)

**R.D. ELLIOTT**, North Amer. Weather Consult.

6.0171 CLOUD SEEDING POTENTIAL FOR TWELVE  
RIVER BASINS

**R.E. EMMER**, Oregon State University, Water Resources  
Research Inst.

6.0352 A COMPARISON OF FLOOD ABATEMENT

**J.R. FERGUSON**, Cornell University, Water Resou. & I.  
Sc. Ctr.

6.0335 STUDIES IN THE ANALYSIS  
METROPOLITAN WATER RESOURCE SYSTEMS  
VOLUME IV - MODELS FOR MANA  
METROPOLITAN SURFACE WATER SYSTEMS

**F.K. FIELDS**, U.S. Dept. of the Interior, Geological Survey

6.0392 MAGNITUDE AND FREQUENCY OF FL  
IN UTAH

**J.A. FINCK**, State Dept. of Env. Conserv.

6.0130 REGIONAL COMPREHENSIVE MULTI  
POSE WATER RESOURCES PLANNING STUDI  
NEW YORK

**A.F. FLANDERS**, U.S. Dept. of Commerce, National W  
Service

6.0103 HYDROLOGIC DATA COLLECTION VIA  
TIONARY SATELLITE

**C.F. FLOYD**, Univ. of Georgia, School of Business Admi

6.0237 IMPLICATIONS OF ZONING AS AN U  
WATER MANAGEMENT MEASURE - GEORGIA

**Y. FOK**, Univ. of Hawaii, Water Resources Research Ctr

6.0076 URBAN HYDROLOGY AND URBAN W  
RESOURCES OF THE ISLAND OF OAHU, HAWA

**Y.S. FOK**, Univ. of Hawaii, Water Resources Research C

6.0077 FLOOD HYDROLOGY AND URBAN W  
RESOURCES OF THE ISLAND OF OAHU, HAWA

**J.H. FOSTER**, Univ. of Massachusetts, School of Agricul

6.0291 ECONOMIC AND LEGAL ANALYSIS O  
TERNATIVE FLOOD CONTROL STRATEGIES

**J.J. FRANCO**, U.S. Army, Waterways Experiment Station

6.0312 MODEL STUDY OF CANNELTON LOCKS  
DAM, OHIO RIVER, INDIANA AND KENTUCKY

**C.M. FULLERTON**, Univ. of Hawaii, Cloud Physics Obs  
ry

6.0246 SPACE-TIME VARIATIONS IN HIGH INTE  
RAINFALL ON THE WINDWARD COAST OF  
ISLAND OF HAWAII (PHASE III)

**J.S. GARDNER**, Iowa State University, Water Res  
Research Inst.

6.0273 THE HUMAN ECOLOGICAL IMPACT  
STRUCTURAL FLOOD CONTROL ON THE  
RIVER, IOWA

**B.J. GARRETT**, U.S. Army, Engineering Division

6.0095 HYDROLOGIC STUDIES (STORM STUDIE

**C.O. GEIGER**, U.S. Dept. of the Interior, Geological Sur

6.0281 EFFECT OF URBANIZATION ON FLOO  
NOFF - WICHITA AREA, KANSAS

**J.E. GODDARD**, Amer. Soc. of Civil Engrs.

6.0132 AN EVALUATION OF URBAN FLOOD PL.

**W.H. GOINES**, U.S. Dept. of the Interior, Geological Sur

6.0375 HYDROLOGIC STUDIES OF SMALL

- OLDEN, U.S. Dept. of the Interior, Geological Survey  
44 ATLANTA METROPOLITAN AREA URBAN  
FLOOD RUNOFF CHARACTERISTICS - GEORGIA
- OODRIDGE, State Dept. of Water Resources  
44 SOUTH COASTAL BASIN PRECIPITATION  
FREQUENCY - A REGIONAL ANALYSIS OF DEPTH-  
URATION FREQUENCY OF SHORT-DURATION  
PRECIPITATION IN CALIFORNIA
- OODWIN, U.S. Dept. of the Interior, Geological Survey  
71 ESTUARINE HYDROLOGY OF TAMPA BAY
- RANT, U.S. Dept. of the Interior, Geological Survey  
8 FLOOD INUNDATION STUDY - WISCONSIN
- GRAYMAN, Mass. Inst. of Technology, School of En-  
gineering  
77 DESIGN OF OPTIMAL PRECIPITATION NET-  
WORKS
- ROPER, U.S. Dept. of Commerce, Weather Bureau  
21 METEOROLOGICAL AND HYDROLOGICAL  
ANALYSIS OF THE AUGUST 27-28, 1971, NEW JER-  
SEY FLOOD
- ACKETT, Virginia Polytechnic Institute, Water  
Resources Research Ctr.  
2 PROCEEDINGS - COMMUNITY WORKSHOP ON  
FLOOD INSURANCE
- AMPTON, U.S. Dept. of the Interior, Geological Survey  
23 URBAN HYDROLOGY STUDY - FORT WORTH,  
TEXAS
- ANNUM, U.S. Dept. of the Interior, Geological Survey  
23 FLOOD-FREQUENCY STUDY - KENTUCKY
- BARBAUGH, Univ. of Missouri, Water Resources  
Research Ctr.  
2 SPILLWAY DESIGN FLOODS FOR SMALL  
DAMS IN RURAL MISSOURI
- BARBAUGH, Univ. of Missouri, Water Resources  
Research Ctr.  
4 FLOOD WAVES FROM A CONTROLLED  
BEACHED DAM
- ARVEY, Boise State College, School of Arts  
3 SILVER VALLEY FLOOD - SOCIAL  
PSYCHOLOGICAL EFFECTS
- AUTH, U.S. Dept. of the Interior, Geological Survey  
6 DEVELOPMENT OF MAGNITUDE AND  
FREQUENCY RELATIONSHIPS OF FLOODS ON  
ALL STREAMS OF MISSOURI
- AYES, State Highway Commission  
7 SMALL STREAMS FLOOD FREQUENCY IN  
MAINE
- MAN, U.S. Dept. of the Interior, Geological Survey  
0 STREAMFLOW CHARACTERISTICS, KANSAS
- ELL, U.S. Dept. of the Interior, Geological Survey  
D.W. HILL, Resources Development Consult.  
6.0191 SOCIALLY DEFINED ENVIRONMENTAL  
VALUES IN URBAN WATER RESOURCES PLANNING
- A.T. HJELMFELT, Univ. of Missouri, School of Engineering  
6.0123 OPTIMIZATION OF OPERATION OF A SYSTEM  
OF FLOOD CONTROL RESERVOIRS
- A.R. HOPEMAN, Univ. of Minnesota, Water Resources  
Research Ctr.  
6.0300 AN ECONOMIC ANALYSIS OF FLOOD  
DAMAGE REDUCTION ALTERNATIVES IN THE MIN-  
NESOTA RIVER BASIN
- J. HORTON, U.S. Dept. of the Interior, Geological Survey  
6.0210 PEAK FLOW FROM SMALL DRAINAGE AREAS  
- CONNECTICUT
- R.L. INGRAM, Univ. of North Carolina, School of Arts  
6.0341 EROSION AND DEPOSITION IN THE SOUNDS  
AND ESTUARIES OF THE NORTH CAROLINA COAST
- L.D. JAMES, Georgia Inst. of Technology, Environmental  
Resources Center  
6.0073 CASE STUDY OF REMEDIAL FLOOD  
MANAGEMENT IN AN URBAN AREA - PHASE III
- L.D. JAMES, Univ. of Kentucky, Water Resources Institute  
6.0092 STREAMFLOW PATTERNS WATERSHED  
CHARACTERISTICS THROUGH USE OF OPSET - A  
SELF CALIBRATING VERSION OF STANFORD  
WATERSHED MODEL (ABBREV)
- L.D. JAMES, Georgia Inst. of Technology, Environmental  
Resources Center  
6.0238 SYNTHESIZING A PROCEDURE FOR FORMU-  
LATING URBAN FLOOD CONTROL PROGRAMS
- L.D. JAMES, Georgia Inst. of Technology, Environmental  
Resources Center  
6.0239 THE FLOOD PLAIN AS A RESIDENTIAL CHO-  
ICE - RESIDENT ATTITUDES AND PERCEPTIONS  
AND THEIR IMPLICATIONS TO FLOOD PLAIN  
MANAGEMENT POLICY
- L.D. JAMES, Georgia Inst. of Technology, Environmental  
Resources Center  
6.0240 THE PEACHTREE CREEK WATERSHED AS A  
CASE HISTORY IN URBAN FLOOD PLAIN DEVELOP-  
MENT
- D. JAY, U.S. Army, Pacific Ocean Division  
6.0247 HYDROLOGIC RELATIONS IN HAWAII
- C.G. JOHNSON, U.S. Dept. of the Interior, Geological Survey  
6.0106 FLOOD FLOW CHARACTERISTICS OF SMALL  
BASINS IN MASSACHUSETTS
- C.G. JOHNSON, U.S. Dept. of the Interior, Geological Survey  
6.0296 FLOOD CHARACTERISTICS OF SMALL  
DRAINAGE BASINS IN VERMONT
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# FLOODS

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6.0386 URBAN HYDROLOGY STUDY - HOUSTON, TEXAS
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6.0085 LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES
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6.0265 RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS
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6.0022 THE METEOROLOGICAL AND HYDROLOGICAL ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS
- P.A. KAMMERER, U.S. Dept. of the Interior, Geological Survey  
6.0408 HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN
- F.P. KAPINOS, U.S. Dept. of the Interior, Geological Survey  
6.0401 URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA
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6.0086 OAKLEY-SANGAMON REMOTE SENSING ENVIRONMENTAL RESEARCH PROGRAM - ILLINOIS
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6.0292 DETERMINATION OF DECISION MAKING PROCESSES IN WATER RESOURCE PLANNING AND DEVELOPMENT - THE CONNECTICUT RIVER BASIN
- E. KEENE, North Kennebec Reg. Pln. Comm.  
6.0288 DATA AND MANAGEMENT NEEDS FOR WATER RELATED LAND AREAS - MAINE
- W.M. KEITH, Univ. of Illinois, Water Resources Center  
6.0266 AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO
- J.W. KELLEY, State University of New York, Agricultural Experiment Sta.  
6.0337 APPLICATION OF LUNR SYSTEM TO FLOOD PLAIN ANALYSIS AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN
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6.0211 HYDROLOGY OF OUTSTANDING FLOODS
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6.0178 NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA
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6.0127 PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN, UNION COUNTY, N.J.
- METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA
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6.0388 RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS
- D.B. KNOWLES, State Geol. Survey  
6.0035 ELEMENTS OF THE WATER RESOURCES SITUATION IN ALABAMA
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6.0167 STOCHASTIC HYDROLOGY
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6.0410 WATER RESOURCES POLICY IN WISCONSIN - VOLUME IV - FLOOD PLAIN MANAGEMENT
- H.H. LADAGE, Columbia Co. Planning Dept.  
6.0333 NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE
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6.0274 FLOOD PROFILES OF IOWA STREAMS
- O.G. LARA, U.S. Dept. of the Interior, Geological Survey  
6.0275 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA
- O.G. LARA, U.S. Dept. of the Interior, Geological Survey  
6.0276 FLOOD PROFILES & FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA
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6.0277 FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA
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6.0278 FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA
- S.M. LEADLEY, Penn. State University, Inst. Res. Land & Wtr. Resour.  
6.0360 SOCIOLOGICAL IMPACT OF A FLOOD-CONTROL RESERVOIR
- G.B. LEE, Univ. of Wisconsin, Water Resources Center  
6.0411 NEW TECHNIQUES FOR DELINEATION OF FLOOD PLAIN HAZARD ZONES - SOIL SURVEYS
- H.W. LEE, State Planning & Com. Aff. Agcy  
6.0253 NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973
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6.0249 SPECIAL FLOOD DATA COLLECTION, HAWAII

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PLAN FORMULATION AND EVALUATION IN  
MULTIPLE PURPOSE WATER RESOURCE PROJECT -  
FRAMEWORK FOR REGIONAL PLANNING (AB-  
V)

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SURVEY OF LAKE FLOODING FROM ERTS-J -  
E CHAMPLAIN

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CHENA RIVER LAKES PROJECT, ALASKA -  
BLEMS RELATING TO CHANNEL DEVELOP-  
NT, EROSION, & BANK & LEVEE PROTECTION

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DENVER METROPOLITAN AREA, COLORADO

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PROCEDURES FOR ESTIMATING FLOOD  
WS FROM SMALL RURAL WATERSHEDS

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OPSET - PROGRAM FOR COMPUTERIZED  
ECTION OF WATERSHED PARAMETER VALUES  
THE STANFORD WATERSHED MODEL

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USE OF SYSTEMS ANALYSIS IN THE  
ELOPMENT OF WATER RESOURCES MANAGE-  
NT PLANS FOR NEW YORK STATE - ADDENDUM

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DELS IN FOUR PHYSIOGRAPHIC REGIONS OF  
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TRAVEL TIME OF GEORGIA STREAMS

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WATER RESOURCES OF THE RED RIVER OF  
NORTH DRAINAGE BASIN IN MINNESOTA

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URBAN HYDROLOGY STUDY - DALLAS  
NTY, TEXAS

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THE IMPACT OF URBANIZATION ON WATER  
D, FLOOD PEAK, SEDIMENT YIELD, AND  
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IFORNIA

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FLOOD FREQUENCY OF ALABAMA STREAMS  
ABAMA

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6.0267 HYDROLOGIC MODELS OF THE GREAT  
LAKES

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6.0412 REMOTE SENSING FOR RESOURCE MANAGE-  
MENT AND FLOOD PLAIN DELINEATION

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6.0180 FLOOD-FREQUENCY RELATIONSHIPS FOR  
SMALL DRAINAGE AREAS - VIRGINIA

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6.0034 FLOOD-FREQUENCY SYNTHESIS FOR SMALL  
STREAMS - ALABAMA

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6.0214 FLOOD FREQUENCY SYNTHESIS FOR SMALL  
STREAMS - ALABAMA

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6.0051 A STUDY OF THE OPTIMAL MIX OF PRIVATE  
AND PUBLIC ACTION FOR LOCAL AND REGIONAL  
WATER CONSERVATION

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vey

6.0250 FLOOD PLAIN MAPPING IN HAWAII

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6.0323 HYDROLOGY OF SUBURBAN AREAS - NEW  
JERSEY

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6.0261 FLOOD INUNDATION MAPPING, NORTHEAST-  
ERN ILLINOIS

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6.0321 FLOODPLAIN MAPPING AND PLANNING FOR  
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OF THE BITTERROOT VALLEY, MONTANA

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6.0046 DRAINAGE AND FLOOD CONTROL  
BACKGROUND AND POLICY STUDY - SAN DIEGO

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gineering

6.0402 PILOT STUDY OF FLOOD PLAIN MANAGE-  
MENT - WASHINGTON

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6.0301 FLOOD FORECASTING IN THE UPPER MID-  
WEST - DATA ASSEMBLY AND PRELIMINARY  
ANALYSIS

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Admin.

6.0289 CLIMATES OF THE STATES - CLIMATE OF  
NEW YORK

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**6.0014 DELIVERING VOCATIONAL REHABILITATION SERVICES IN A DISASTER AREA**

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**6.0117 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION**

**G.A. PICKERING**, U.S. Army, Waterways Experiment Station

**6.0118 ANSONIA-DERBY LOCAL PROTECTION PROJECT, NAUGATUCK AND HOUSATONIC RIVERS, CONNECTICUT - HYDRAULIC MODEL INVESTIGATION**

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**6.0185 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR**

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**6.0068 RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA**

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**6.0134 EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA**

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**6.0135 EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA**

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**6.0136 EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA**

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**6.0343 EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA**

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**6.0101 THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS**

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**6.0144 OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS**

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**6.0145 FLOOD PREDICTION METHODS FOR PENNSYLVANIA HIGHWAY CROSSINGS**

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**6.0146 FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS**

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**6.0355 AN EVALUATION OF HURRICANE AGNES FLOODS IN COMPARISON TO BRIDGE DESIGN INFORMATION AVAILABLE FOR PENNSYLVANIA CONTEMPORANEOUSLY**

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**6.0361 EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA**

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**6.0066 AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMMEE RIVER BASIN - FLORIDA**

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**6.0348 STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY**

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**6.0041 FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST**

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**6.0282 EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA**

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**6.0290 PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOUTHERN RIVER ABOVE MINOT, NORTH DAKOTA**

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**6.0215 FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS**

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**6.0031 STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY**

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**6.0325 FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY**

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**6.0032 NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I**

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**6.0139 STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA**

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**6.0216 WATER RESOURCES INVESTIGATIONS**

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**6.0061 PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS**

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**6.0279 FLOOD PROFILES AND FLOOD-PLAIN INFOR-**

SMALL DRAINAGE AREAS IN NEW MEXICO

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7 PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA

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7 COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT

HEARMAN, U.S. Dept. of the Interior, Geological Survey

2 FLOW REGULATION EFFECTS OF THE RELLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA

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9 FLOOD INUNDATION STUDY, WISCONSIN

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9 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES

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9 INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES

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9 FLOOD PROTECTION AT CULVERT OUTLETS

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9 URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA

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3 STREAMFLOW VARIABILITY - ILLINOIS

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3 BEECH RIVER WATERSHED PROJECT - TENNESSEE

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6 WORTH OF HYDROLOGIC DATA FOR SHORT-TERM FORECASTS OF FLOODS

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7 STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD-PRONE AREAS IN ALABAMA

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9 URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY

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7 HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA

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4 HYDROLOGIC EQUIPMENT - FLASH FLOOD WARNING SYSTEM

TEXAS

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6.0114 BRIDGE SITE INVESTIGATIONS

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6.0115 SPECIAL FLOOD REPORTS - MISSISSIPPI

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6.0328 THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I

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6.0063 FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO

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6.0254 MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO

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6.0193 SMALL STREAM FLOOD CHARACTERISTICS

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6.0217 INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA

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6.0298 USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS

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6.0070 STUDIES OF THE RED ALGAE IN BISCAYNE BAY

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6.0271 WABASH RIVER SYSTEMS MODELS FOR PROJECT MANAGEMENT, PLANNING AND EVALUATION

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6.0234 HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCLOTE RIVER BASINS, FLORIDA

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6.0154 PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I

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6.0002 THE FEDERAL RESPONSE TO TROPICAL STORM AGNES; A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF

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6.0008 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA

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6.0009 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA

## FLOODS

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- 6.0011 MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA

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- 6.0015 ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME I

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- 6.0017 UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL.

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- 6.0023 FLOOD FREQUENCY AND HIGH-FLOW STUDIES

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- 6.0024 LOCK HAVEN URBAN RENEWAL PROJECT, LOCK HAVEN, PENNSYLVANIA

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- 6.0025 MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA

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- 6.0026 PENN-SUSQUEHANNA URBAN RENEWAL PROJECT, HARRISBURG, PENNSYLVANIA, HUD PROJECT NO. R-634C

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- 6.0027 MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA

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- 6.0028 DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA

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- 6.0029 KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C

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- 6.0047 INITIAL WATER, SEWERAGE AND FLOOD

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- 6.0052 REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD

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- 6.0054 JACKSON HOLE FLOOD CONTROL PROJECT

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- 6.0055 HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE

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- 6.0056 BLACK HILLS FLOOD OF JUNE 9, 1972

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- 6.0057 ESSA AND OPERATION FORESIGHT

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- 6.0064 COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA

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- 6.0069 HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA

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- 6.0072 ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT

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- 6.0079 FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO

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- 6.0081 WATER WARNINGS AND SPECIALIZED FORECASTS

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- 6.0084 BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST. CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS

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6.0099 MORGAN CITY, LOUISIANA, AND VICINITY  
(FRANKLIN AND VICINITY AREA)

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6.0100 RED RIVER EMERGENCY BANK PROTECTION,  
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6.0109 OPERATION AND MAINTENANCE OF NEW  
BEDFORD HURRICANE BARRIER, MASSACHUSETTS

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6.0110 OPERATION AND MAINTENANCE OF NEW  
BEDFORD HURRICANE BARRIER, NEW BEDFORD,  
MASSACHUSETTS

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NORTH ADAMS MASSACHUSETTS

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6.0121 FLOOD CONTROL IN THE LOWER MISSISSIPPI  
RIVER VALLEY

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6.0128 FACTORS PERTINENT TO WATER QUALITY  
IN THE ALBUQUERQUE METROPOLITAN AREA

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6.0133 WATER RELATED ENVIRONMENTAL SER-  
VICES

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0140 INVESTIGATION AND ANALYSIS OF FLOODS  
FROM SMALL WATERSHEDS IN OKLAHOMA

UNKNOWN, U.S. Army, Engineer District  
6.0141 BIG HILL LAKE, BIG HILL CREEK, KANSAS

UNKNOWN, U.S. Army, Engineer District  
6.0142 BIRCH LAKE, BIRCH CREEK, OKLAHOMA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0143 TEST OF THE ERTS-DATA COLLECTION  
SYSTEM IN THE SUSQUEHANNA RIVER BASIN

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0147 FLOOD INVESTIGATIONS - TENNESSEE

UNKNOWN, State Div. of Comp. Planning  
6.0148 COMPREHENSIVE PLAN, CITY OF HAMILTON,  
TEXAS

UNKNOWN, U.S. Army, Engineer District  
6.0152 PORT ARTHUR HURRICANE FLOOD PROTEC-  
TION, PORT ARTHUR AND VICINITY, TEXAS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0156 RUNOFF SIMULATION

UNKNOWN, South Alabama Reg. Plan. Comm.  
6.0158 A GUIDE FOR REDUCING FLOOD DAMAGE IN  
THE SOUTH ALABAMA REGION

UNKNOWN, Tuscaloosa Area Coun. of Gov.  
6.0159 FLOOD MANAGEMENT STUDY

UNKNOWN, Tuscaloosa Area Coun. of Gov.  
6.0160 FLOOD MANAGEMENT STUDY -  
TUSCALOOSA, PICKENS COUNTY AND MOUND-  
SVILLE, ALABAMA, MAY 1971

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0165 DEVELOPMENT OF AERIAL MEASUREMENT  
TECHNIQUES

UNKNOWN, Glendora City Government  
6.0170 GLENDORA, CALIFORNIA, GENERAL PLAN  
1990

UNKNOWN, U.S. Army, Engineer District  
6.0172 SANTA ANA RIVER BASIN, FLOOD CONTROL  
PROJECT, EAST TWIN AND WARM CREEK IM-  
PROVEMENT

UNKNOWN, Council on Intergov. Relations  
6.0179 GENERAL PLAN REPORT, LAKE RED BLUFF  
AREA, CALIFORNIA, 1971

UNKNOWN, San Diego Reg. Comp. Pl. Org.  
6.0181 DRAINAGE AND FLOOD CONTROL  
BACKGROUND AND POLICY STUDY - SUMMARY  
REPORT

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0186 PEAK DISCHARGE AND FREQUENCY FOR  
SMALL WATERSHEDS IN COLORADO

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0187 FLOOD FREQUENCY IN URBAN AREAS -  
COLORADO

UNKNOWN, Valley Regional Planning Agcy.  
6.0192 RECOMMENDED REGIONAL PLAN FOR  
SEWERAGE, WATER SUPPLY AND STORM  
DRAINAGE - CONNECTICUT

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Ser-  
vice  
6.0195 KANSAS - NORTH SECTOR UPPER WALNUT  
WATERSHED BUTLER AND CHASE COUNTIES

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Ser-  
vice  
6.0196 UNION CREEK WATERSHED PROJECT, SOUTH  
DAKOTA

## FLOODS

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0197 HOLLOW CREEK WATERSHED PROJECT, SOUTH CAROLINA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0198 KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0199 NUTWOOD WATERSHED, ILLINOIS

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0200 HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0201 CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0202 BIG CREEK WATERSHED, KANSAS

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0203 MACADOO ROAD-FILL DAM, KANSAS

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0204 STARKWEATHER WATERSHED, NORTH DAKOTA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0205 VERDE LAKE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA

UNKNOWN, U.S. Dept. of Agriculture, Soil Conservation Service  
6.0206 WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0218 IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0219 INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0220 DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0221 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES

UNKNOWN, U.S. Water Resources Council  
6.0224 A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES

UNKNOWN, U.S. Water Resources Council  
6.0225 FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES

UNKNOWN, U.S. Water Resources Council  
6.0226 REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV

UNKNOWN, U.S. Water Resources Council  
6.0227 NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL REPORT, FISCAL YEAR 1971

UNKNOWN, U.S. Water Resources Council  
6.0228 OHIO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U.S. WATER RESOURCES COUNCIL (ABBREV)

UNKNOWN, U.S. Water Resources Council  
6.0229 FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES

UNKNOWN, Tampa Bay Regional Plan. Comm.  
6.0232 ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA

UNKNOWN, Palm Beach Co. Area Plan. Bd.  
6.0235 FLOOD PLAIN STUDY AND MODEL, FLOOD PLAIN ORDINANCE

UNKNOWN, Palm Beach Co. Area Plan. Bd.  
6.0236 FLOOD PLAIN STUDY AND MODEL, FLOOD PLAIN ORDINANCE, MARCH, 1972

UNKNOWN, Middle Georgia Area Plan. Comm.  
6.0245 WATER RESOURCES OF MIDDLE GEORGIA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0251 SPECIAL FLOOD-DATA COLLECTION - HAWAII

UNKNOWN, Macon Co. Regional Plan Comm.  
6.0258 NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS

UNKNOWN, Stephenson Co. Planning Comm.  
6.0260 A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS

UNKNOWN, State Dept. of Bus. & Dev.  
6.0262 PRIORITY AND PLANNING ELEMENTS FOR DEVELOPING ILLINOIS WATER RESOURCES

UNKNOWN, Clyde E. Williams & Assoc. Inc.  
6.0268 ZONING ORDINANCE - KNOX COUNTY, INDIANA

UNKNOWN, State Program Dev. Office  
6.0283 ZONING ORDINANCE AND DEVELOPMENT

UNKNOWN, Lower Minn. Riv. Wtrshed Dist.

6.0302 THE EFFECTIVENESS OF FLOOD CONTROL  
STRUCTURE OF THE LOWER MINNESOTA RIVER  
WATERSHED DISTRICT

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0304 FLOOD PLAIN STUDIES--MINNESOTA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0305 FLOOD PLAIN MANAGEMENT STUDIES -  
LOWER MINNESOTA RIVER

UNKNOWN, U.S. Army, Waterways Experiment Station

6.0313 MISSISSIPPI BASIN MODEL

UNKNOWN, U.S. Army, Waterways Experiment Station

6.0314 DEMONSTRATION OF THE ELECTRIC  
ANALOG MODEL OF THE KANSAS RIVER AT THE  
UNIVERSITY OF CALIFORNIA IN BERKELEY

UNKNOWN, U.S. Army, Engineer District

6.0315 FORT SCOTT LAKE, MARMATON RIVER, KAN-  
SAS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0318 STORAGE REQUIREMENTS TO CONTROL  
FLOOD FLOWS OF MISSOURI STREAMS

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0319 HYDROLOGY OF STREAMS IN ST. LOUIS  
COUNTY - MISSOURI

UNKNOWN, U.S. Army, Engineer District

6.0320 MERAMEC PARK LAKE, UPPER MISSISSIPPI  
RIVER BASIN, MERAMEC RIVER, MISSOURI

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0326 DETERMINATION OF FLOOD PEAKS, FLOOD  
PROFILES, & FLOOD INUNDATION - NEW JERSEY

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0327 FLOOD FREQUENCY STUDY IN NEW MEXICO

UNKNOWN, State Off. of Plan. Services

6.0329 STREAMS AND DRAINAGE BASINS - FULTON  
COUNTY, NEW YORK

UNKNOWN, State Off. of Plan. Services

6.0330 PUTNAM COUNTY OFFICIAL MAP -  
PROPOSALS FOR REVISION AND EXPANSION

UNKNOWN, Aurora Planning Board

6.0332 COMPREHENSIVE PLAN - REPORT C, IMPL-  
EMENTATION - VILLAGE OF EAST AURORA, N.Y.,  
TOWN OF AURORA, N.Y.

UNKNOWN, Genesee Finger Lake Reg. Board

6.0340 DRAINAGE STUDY - INVENTORY AND ANAL-  
YSIS

UNKNOWN, State Water Resour. Board

6.0350 APPRAISAL OF THE WATER AND RELATED  
LAND RESOURCES OF OKLAHOMA - REGION EIGHT  
- 1971

UNKNOWN, Clatsop Tillamook Intergov.

6.0352 FLOOD PLAIN ANALYSIS AND DISASTER STU-  
DY, CLATSOP AND TILLAMOOK COUNTIES,  
OREGON - 1972-1973

UNKNOWN, Lincoln Co. Planning Dept.

6.0354 DEVELOPMENT IN FLOOD-PRONE AREAS OF  
LINCOLN COUNTY, OREGON AUGUST, 1973

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0357 THE EFFECT OF GROUND-WATER CONDI-  
TIONS ON LOCAL FLOODING IN THE KINGSTON  
AREA, PENNSYLVANIA

UNKNOWN, U.S. Army, Engineer District

6.0358 FLOOD-PROOFING REGULATIONS

UNKNOWN, State Planning Board

6.0362 FLOOD CONTROL STUDY OF RIO GRANDE DE  
MANATI, MANATI AND BARCELONETA, PUERTO  
RICO

UNKNOWN, State Planning & Grants Div.

6.0363 MYRTLE BEACH, S.C. - COMPREHENSIVE  
DEVELOPMENT PLAN

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0364 FLOOD PLAIN INUNDATION

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0365 FLOOD FREQUENCY OF SMALL AREAS -  
SOUTH CAROLINA

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0366 INVESTIGATION AND ANALYSIS OF FLOOD  
HYDROGRAPHS FROM SMALL DRAINAGE BASINS  
IN SOUTH DAKOTA

UNKNOWN, State Planning Commission

6.0369 ZONING ORDINANCE, HUNTINGDON, TEN-  
NESSEE

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

6.0377 URBAN HYDROLOGY STUDY - SAN ANTONIO,  
TEXAS

UNKNOWN, Texas A & M University System, Water  
Resources Institute

6.0379 WATER FOR TEXAS - URBAN WATER  
RESOURCES PLANNING AND MANAGEMENT - THE  
PROCEEDINGS OF THE ANNUAL CONFERENCE  
HELD AT SAN ANTONIO (ABBREV)

UNKNOWN, U.S. Coastal Bend Reg. Comm.

6.0380 OSO CREEK TECHNICAL ASSISTANCE STUDY  
- PRELIMINARY STUDY ON THE PROBLEMS AND  
OPPORTUNITIES FOR DEVELOPMENT OF OSO  
CREEK AND OSO BAY

UNKNOWN, Texoma Regional Planning Comm.

6.0381 SOIL AND WATER CONSERVATION NEEDS IN-  
VENTORY, COOKE, GRAYSON AND FANNIN COUN-  
TIES, TEXAS



- UNKNOWN, U.S. Army, Corps of Engineers  
6.0405 FLOOD HAZARD INFORMATION - BUFFALO  
CREEK, LOGAN COUNTY, WEST VIRGINIA POST-  
DISASTER CONDITIONS
- UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
6.0415 STUDY OF FLOOD HYDROGRAPHS FOR  
SMALL DRAINAGE BASINS IN WYOMING
- A.O. WAANANEN, State Dept. of Transportation  
6.0043 FLOODS FROM SMALL DRAINAGE AREAS IN  
CALIFORNIA
- A.O. WAANANEN, U.S. Dept. of the Interior, Geological Sur-  
vey  
6.0176 FLOODS FROM SMALL DRAINAGE AREAS -  
CALIFORNIA
- J.J. WAELTI, Univ. of Minnesota, School of Agriculture  
6.0306 SOCIO-ECONOMIC IMPLICATIONS OF ALTER-  
NATIVE WATER RESOURCES POLICIES IN MIN-  
NESOTA
- A. WAHBY, Bullitt Co. Planning Comm.  
6.0286 FLOOD PLAN FOR BULLITT COUNTY, KEN-  
TUCKY
- L.A. WAITE, U.S. Dept. of the Interior, Geological Survey  
6.0020 FLOOD OF JULY 17, 1972 IN GALLUP, NEW  
MEXICO
- W.R. WALKER, Virginia Polytechnic Institute, Graduate  
School  
6.0013 EVALUATION OF FLOOD INSURANCE IN A  
DISASTER AREA
- W.R. WALKER, Virginia Polytechnic Institute, Water  
Resources Research Ctr.  
6.0398 FLOOD DAMAGE ABATEMENT: FEDERAL  
ASSISTANCE TO LOCAL GOVERNMENT
- W.R. WALKER, Virginia Polytechnic Institute, Water  
Resources Research Ctr.  
6.0399 FLOOD DAMAGE ABATEMENT STUDY FOR  
VIRGINIA
- J.R. WALLACE, Georgia Inst. of Technology, Environmental  
Resources Center  
6.0242 THE EFFECTS OF LAND USE CHANGE ON  
THE HYDROLOGY OF AN URBAN WATERSHED
- R. WANG, Univ. of Hawaii, Water Resources Research Ctr.  
6.0078 INSTANTANEOUS UNIT HYDROGRAPH ANAL-  
YSIS OF HAWAIIAN SMALL WATERSHEDS
- B.E. WASSON, U.S. Dept. of the Interior, Geological Survey  
6.0310 CITY OF JACKSON, MISSISSIPPI, WATER  
RESOURCES STUDY
- E.E. WEBBER, U.S. Dept. of the Interior, Geological Survey  
6.0349 FLOOD HYDROLOGY OF SMALL DRAINAGE  
AREAS

- D.M. WELLS, Texas Technological U.  
Resources Center  
6.0387 VARIATION OF URBAN RUNOFF  
AND INTENSITY OF STORMS -
- J.D. WELLS, U.S. Dept. of the Interior, Geol.  
6.0188 HAMILTON 2 DEGREE
- B.H. WHETSTONE, U.S. Dept. of the Interior,  
vev  
6.0222 INVESTIGATION AND ANALYSIS  
FROM SMALL DRAINAGE AREA  
CAROLINA
- W. WHIPPLE, Rutgers the State University,  
Research Inst.  
6.0324 ECONOMIC BASIS FOR WATER  
ANALYSIS
- H.C. WIBBEN, U.S. Dept. of the Interior, Geol.  
6.0371 INVESTIGATION OF THE MA-  
FREQUENCY OF FLOODS ON SMALL  
TENNESSEE
- D. WILKES, Univ. of Massachusetts, Man &  
Inst.  
6.0293 LEGAL ISSUES ON ECONOMIC  
OF THE CONNECTICUT RIVER FLOOD
- D. WILKES, Univ. of Massachusetts, W  
Research Ctr.  
6.0294 LEGAL FACTORS IN ECONOMIC  
ING OF LOCAL FLOODPLAIN M  
DEVICES IN THE CONNECTICUT RIVE
- G.E. WILLEKE, Georgia Inst. of Technology  
Resources Center  
6.0243 A PROGRAM FOR METROPOL  
MANAGEMENT
- G.L. WILLIAMS, Lockwood Andrews & Newn  
6.0385 PALACIOS COMPREHENSIVE PL  
- SUMMARY REPORT
- P. WILLIAMS, U.S. Dept. of Commerce, Nat  
vice  
6.0391 FLASH FLOOD FORECASTING A  
PROGRAM IN THE WESTERN REGION
- T.T. WILLIAMS, Montana State University, W  
Research Ctr.  
6.0126 DEVELOPMENT OF AN OPERA  
FOR MONTANA'S WATER RESOURC  
CREEK RESERVOIR OPERATION
- J.A. WILSON, Iowa State University, W  
Research Inst.  
6.0089 PLANT SPECIES AS WILDLIFE  
EROSION CONTROL ON 'MUDFLATS'  
LARGE RESERVOIR SYSTEMS
- K.V. WILSON, U.S. Dept. of the Interior, Geol.  
6.0065 FLOOD FREQUENCY IN SMALL  
AREAS - MISSISSIPPI

K.V. WILSON, U.S. Dept. of the Interior, Geological Survey  
6.0311 CITY OF JACKSON WATER RESOURCES STUDY

D.A. YANGGEN, Univ. of Wisconsin, Water Resources Center  
6.0413 THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS

V. YEVJEVICH, Colorado State University, School of Engineering  
6.0190 HYDROLOGY OF SMALL WATERSHEDS

## HAIL

J.T. ALFORE, State Div. of Mines & Geology  
7.0009 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

C.E. ANDERSON, Univ. of Wisconsin, School of Natural Sciences  
7.0018 STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN

L. BOONE, Univ. of Nebraska, U.S.D.A. Nat. Resour. Ec. Div.  
7.0005 ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL

L.M. BOONE, U.S. Dept. of Agriculture, Economic & Stat. Analysis Div.  
7.0001 ESTIMATING CROP LOSSES DUE TO HAIL. STATISTICAL SUPPLEMENT TO AGRICULTURAL ECONOMIC REPORT NO. 267

L.M. BOONE, U.S. Dept. of Agriculture, Economic Research Service  
7.0007 ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL

S.A. CHANGNON, State Water Survey  
7.0008 STUDIES OF HAIL DATA IN 1970-72 - ILLINOIS

J.W. FIROR, Natl. Center For Atmosph. Res.  
7.0010 NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT FOR 1973 - COLORADO

L.D. GRANT, Colorado State University, School of Engineering  
7.0013 EXTENDED AREA EFFECTS FROM LOCAL WEATHER MODIFICATION

L.A. JONES, U.S. Dept. of Agriculture, Farm Production Economics Div.  
7.0002 MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE

G.M. MORGAN, Univ. of Illinois, School of Liberal Arts  
7.0015 DESIGN OF HAIL SUPPRESSION EXPERIMENT IN ILLINOIS

C.M. SAKAMOTO, U.S. Dept. of Commerce, Natl. Weather Service

7.0016 THUNDERSTORMS AND HAIL DAYS PROBABILITIES IN NEVADA

P.T. SCHICKEDANZ, State Water Survey  
7.0003 A STUDY OF CROP-HAIL INSURANCE RECORDS FOR NORTHEASTERN COLORADO WITH RESPECT TO THE DESIGN OF THE NATIONAL HAIL EXPERIMENT

UNKNOWN, Natl. Center For Atmosph. Res.  
7.0011 THE NATIONAL HAIL RESEARCH EXPERIMENT SUMMER 1973 SUMMARY REPORT

UNKNOWN, U.S. Natl. Science Foundation  
7.0014 NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING

J.J. VORST, Purdue University, Agricultural Experiment Sta.  
7.0004 SOYBEAN PHYSIOLOGY AND MANAGEMENT

H. WEICKMANN, U.S. Dept. of Commerce, Environ. Research Laboratories  
7.0012 HAIL AND LIGHTNING - COLORADO

J.A. YOUNG, Battelle Memorial Institute  
7.0017 TRACER STUDIES IN THE NATIONAL HAIL RESEARCH EXPERIMENT (NHRE)

## HURRICANES

F.M. ABDELAAL, Univ. of California, School of Engineering  
8.0051 PRELIMINARY REPORT ON AN ANALYSIS OF PROJECT II DATA (WAVE FORCES ON A PILE), HURRICANE CARLA, GULF OF MEXICO

J.T. ALFORE, State Div. of Mines & Geology  
8.0018 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

L.G. ANDERSON, Univ. of Miami, School of Marine Science  
8.0006 APPLICATION OF ECONOMIC ANALYSES TO HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U. S. GULF OF MEXICO COASTAL REGION

R.A. ANTHES, Penn. State University, School of Earth Sciences  
8.0125 NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES

D.G. AREY, Univ. of Pittsburgh, Graduate School  
8.0124 ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS

T.W. BILHORN, Gulf Univ. Res. Consortium  
8.0049 THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST

- PORT 3 - EFFECTS OF PROPOSED EXPANSION OF MONTEREY HARBOR ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREVI)
- W.H. BOBB, U.S. Army, Waterways Experiment Station  
8.0039 GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREVI)
- B.R. BODINE, U.S. Army, Coastal Engin. Res. Center  
8.0072 STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION
- J. BOTTOMS, U.S. Dept. of Commerce, Natl. Weather Service  
8.0097 GIANT WAVES HIT HAWAII
- N.J. BROGDON, U.S. Army, Estuaries Division  
8.0013 TEXAS COAST HURRICANE SURGE MODEL STUDIES
- N.J. BROGDON, U.S. Army, Waterways Experiment Station  
8.0040 GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION
- G.F. CARRIER, Harvard University, School of Arts  
8.0117 NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH
- C.E. CHATHAM, U.S. Army, Waterways Experiment Station  
8.0041 WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY HARBOR, MONTEREY, CALIFORNIA - HYDRAULIC MODEL INVESTIGATION
- S.G. COLGAN, U.S. Navy, Postgraduate School  
8.0052 FURTHER VERIFICATIONS OF AND EXPERIMENTS TO IMPROVE THE MODIFIED HATRACK SCHEME FOR FORECASTING THE MOTION OF TROPICAL CYCLONES
- D. CORRELL, Smithsonian Institution  
8.0003 EFFECTS OF TROPICAL STORM AGNES ON THE CHESAPEAKE BAY
- M.E. CRISWELL, U.S. Army, Waterways Experiment Station  
8.0014 SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969
- H.L. CRUTCHER, U.S. Navy, Weather Service Command  
8.0080 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME I - 24 HOUR MOVEMENT
- H.L. CRUTCHER, U.S. Navy, Weather Service Command  
8.0081 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT
- H.L. CRUTCHER, U.S. Navy, Weather Service Command  
8.0082 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT
- H.L. CRUTCHER, U.S. Dept. of Commerce, Natl. Climatic Center  
8.0122 ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS AND THE MONTH OF SEPTEMBER)
- P. DERGARABEDIAN, T.R.W. Incorporated  
8.0054 TROPICAL CYCLONE ENERGY TRANSFER
- R.D. DIKKERS, U.S. Dept. of Commerce, Building Research Div.  
8.0074 HURRICANE CAMILLE - AUGUST 1969
- V.F. DVORAK, U.S. Dept. of Commerce, Natl. Environ. Satellite Serv.  
8.0075 A TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES
- C.C. EASTERBROOK, Calspan Corporation  
8.0121 CASE STUDIES OF COASTAL CONVECTIVE STORMS AS OBSERVED BY DOPPLER RADAR
- M.A. ESTOQUE, Univ. of Miami, School of Marine Science  
8.0096 HURRICANE MODIFICATION BY CLOUD SEEDING
- F.E. FENDELL, T.R.W. Incorporated  
8.0055 TROPICAL CYCLONES
- R.W. FETT, U.S. Navy, Environ. Pred. Res. Facility  
8.0053 TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES
- A.F. FLANDERS, U.S. Dept. of Commerce, Off. of Hydrology  
8.0108 VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF THE GOES SATELLITE
- E.P. FORTSON, U.S. Army, Waterways Experiment Station  
8.0042 WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION
- W.T. FOX, Williams College, Graduate School  
8.0118 PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN
- N.L. FRANK, U.S. Dept. of Commerce, Natl. Hurricane Center  
8.0084 ATLANTIC TROPICAL SYSTEMS OF 1972
- T.T. FUJITA, Univ. of Chicago, School of Physical Sciences  
8.0100 PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY
- R.C. GENTRY, U.S. Dept. of Commerce, Environ. Research Laboratories  
8.0057 HURRICANE MODIFICATION
- R.C. GENTRY, U.S. Dept. of Commerce, Environ. Research Laboratories  
8.0058 TROPICAL METEOROLOGIC PROBLEMS
- R.C. GENTRY, U.S. Dept. of Commerce, Natl. Hurricane Res. Lab.  
8.0085 HURRICANE DEBBIE MODIFICATION EXPERIMENTS, AUGUST 1969
- C.R. GOODWIN, U.S. Dept. of the Interior, Geological Survey  
8.0027 ESTUARINE HYDROLOGY OF TAMPA BAY

- W.M. GRAY, Colorado State University, School of Engineering  
8.0066 INVESTIGATION OF SATELLITE OBSERVED  
TYPHOON-HURRICANE CLOUD CLUSTERS AND  
FLOW FEATURES
- W.M. GRAY, Colorado State University, School of Engineering  
8.0067 STUDIES OF CUMULUS HEATING AND THE  
CISK MECHANISM
- J.V. HALL, U.S. Army, Coastal Engin. Res. Center  
8.0019 CONCRETE BLOCK REVETMENT NEAR  
BENEDICT, MARYLAND
- W. HARRISON, Virginia Inst. of Marine Sci.  
8.0134 FORECASTING STORM-INDUCED BEACH  
CHANGES ALONG VIRGINIA'S OCEAN COAST
- T.C. HILL, U.S. Army, Waterways Experiment Station  
8.0119 JAMAICA BAY HURRICANE BARRIER STUDY  
NEW YORK
- J.R. HOPE, U.S. Dept. of Commerce, Natl. Weather Service  
8.0086 COMPUTER METHODS APPLIED TO ATLANTIC  
AREA TROPICAL STORM AND HURRICANE CLIMATOLOGY
- B.R. JARVINEN, U.S. Dept. of Commerce, Natl. Hurricane  
Center  
8.0087 OBJECTIVE ANALYSIS OF SEA SURFACE TEMPERATURES (SST)
- B.R. JARVINEN, U.S. Dept. of Commerce, Natl. Hurricane  
Center  
8.0088 CIRCULATION FEATURES OF TROPICAL  
CYCLONES
- B.R. JARVINEN, U.S. Dept. of Commerce, Natl. Weather Service  
8.0129 OBJECTIVE ANALYSIS OF THE SEA SURFACE  
TEMPERATURE
- C.P. JELESNIANSKI, U.S. Dept. of Commerce, Weather  
Modification Prg. Off.  
8.0059 A PRELIMINARY VIEW OF STORM SURGES  
BEFORE AND AFTER STORM MODIFICATIONS
- C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques  
Development Lab.  
8.0109 TROPICAL STORM SURGE FORECASTING
- C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques  
Development Lab.  
8.0110 SPECIAL PROGRAM TO LIST AMPLITUDES OF  
SURGES FROM HURRICANES - 1. LANDFALL  
STORMS
- C.P. JELESNIANSKI, U.S. Dept. of Commerce, Techniques  
Development Lab.  
8.0111 SPECIAL PROGRAM TO LIST AMPLITUDES OF  
SURGES FROM HURRICANES - PART 2. GENERAL  
TRACK AND VARIANT STORM CONDITIONS
- D.R. JOHNSON, Univ. of Wisconsin, Graduate School  
8.0137 ENERGY, MASS AND ANGULAR MOMENTUM  
BUDGETS OF EXTRATROPICAL CYCLONES
- J.L. KING, U.S. Natl. Aero. & Space Adm., Goddard Space  
Flight Center  
8.0104 MICROWAVE METEOROLOGY
- A. KUO, Virginia Inst. of Marine Sci.  
8.0135 OPERATION AGNES
- Y. KURIHARA, Princeton University, Graduate School  
8.0120 MICRO AND MESOSCALE GEOPHYSICAL  
FLUID DYNAMICS
- R.D. MARSHALL, U.S. Dept. of Commerce, Natl. Bureau of  
Standards  
8.0076 HURRICANE EFFECTS ON PORT FACILITIES
- E.C. MCNAIR, U.S. Army, Waterways Experiment Station  
8.0043 DISCHARGE CHARACTERISTICS OF HURRICANE  
BARRIERS, WAREHAM-MARION, MASSACHUSETTS -  
HYDRAULIC MODEL INVESTIGATION
- A.R. MEALS, U.S. Air Force, Environ. Tech. Appl. Center  
8.0071 A SURVEY OF AVAILABILITY OF HURRICANE/  
TYPHOON PACKAGES AND ASSOCIATED DATA
- A.J. MEHTA, Univ. of Florida, School of Engineering  
8.0024 KENNEDY SPACE CENTER OCEAN BEACH  
EROSION - FLORIDA
- B.I. MILLER, U.S. Dept. of Commerce, Natl. Hurricane  
Center  
8.0089 PREDICTION OF HURRICANE DEVELOPMENT  
AND MOVEMENT WITH A BAROCLINIC MODEL
- P. MONTJOY, Coast Code Administration  
8.0010 REGIONAL CODE ENFORCEMENT - HANCOCK,  
HARRISON AND JACKSON COUNTIES, MISSISSIPPI
- T. MURAKAMI, Univ. of Hawaii, School of Arts  
8.0098 USE OF SATELLITE DATA IN STUDIES OF  
TROPICAL DISTURBANCES
- T. MURAKAMI, Univ. of Hawaii, School of Arts  
8.0099 THEORETICAL ANALYSIS OF LARGE-SCALE  
TROPICAL DISTURBANCES
- V.A. MYERS, U.S. Dept. of Commerce, National Weather  
Service  
8.0112 JOINT PROBABILITY METHOD OF TIDE  
FREQUENCY ANALYSIS APPLIED TO ATLANTIC  
CITY AND LONG BEACH ISLAND, NEW JERSEY
- C.J. NAUMANN, U.S. Dept. of Commerce, Natl. Hurricane  
Center  
8.0090 GRAPHICAL DISPLAY OF HURRICANE  
FORECASTS
- C.J. NEUMANN, U.S. Dept. of Commerce, Natl. Hurricane  
Center  
8.0091 STATISTICAL-DYNAMICAL PREDICTION OF  
HURRICANE TRACKS
- J.W. NICKERSON, U.S. Navy, Weather Research Facility

## HURRICANES

E. OSTAPOFF, U.S. Dept. of Commerce, Environ. Research Laboratories  
8.0060 STORM SURGE RESEARCH

T.L. PAEZ, Purdue University, School of Civil Engin.  
8.0102 PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES

J.M. PELISSIER, U.S. Dept. of Commerce, Natl. Hurricane Center  
8.0092 ERROR ANALYSIS OF HURRICANE FORECASTS

G.A. PICKERING, U.S. Army, Waterways Experiment Station  
8.0044 DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION

A.C. PIKE, U.S. Dept. of Commerce, Natl. Hurricane Center  
8.0093 BAROTROPIC PREDICTION OF HURRICANE TRACKS

N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab  
8.0113 MARINE ENVIRONMENTAL PREDICTION

N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab  
8.0114 SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS

N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab  
8.0115 MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972

N.A. PORE, U.S. Dept. of Commerce, Techniques Development Lab  
8.0116 FORECASTING EXTRATROPICAL STORM SURGES FOR THE NORTHEAST COAST OF THE UNITED STATES

J.C. PURVIS, U.S. Dept. of Commerce, Natl. Weather Service  
8.0127 SOUTH CAROLINA HURRICANES OR A DESCRIPTIVE LISTING OF TROPICAL CYCLONES THAT HAVE AFFECTED SOUTH CAROLINA

D.B. RAO, Univ. of Wisconsin, School of Letters  
8.0138 NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO

W.F. REPS, U.S. Dept. of Commerce, Center For Building Technology  
8.0077 DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS

S.L. ROSENTHAL, U.S. Dept. of Commerce, Environ. Research Laboratories

A. SACHS, Inst. For Defense Analysis  
8.0017 NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I

H.S. SAFFIR, Unknown Inst. or Indiv. Grant  
8.0007 THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE

R.A. SAGER, U.S. Army, Waterways Experiment Station  
8.0045 GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREVI)

R.A. SAGER, U.S. Army, Waterways Experiment Station  
8.0046 GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREVI)

M. SCHERER, U.S. Dept. of Commerce, Environ. Research Laboratories  
8.0063 HURRICANE-TYPHOON DYNAMICS

M. SCHERER, U.S. Dept. of Commerce, Environ. Research Laboratories  
8.0064 HURRICANE-OCEAN INTERACTION

J.R. SCHUBEL, Johns Hopkins University, Graduate School  
8.0009 ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES

W.N. SEELIG, Texas A & M University System, Graduate School  
8.0128 INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS

D.J. SHEA, Colorado State University, School of Engineering  
8.0069 THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION

H.B. SIMMONS, U.S. Army, Waterways Experiment Station  
8.0047 PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service  
8.0005 ATLANTIC HURRICANE SEASON OF 1972

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Hurricane Center  
8.0094 LANDFALL ERRORS IN HURRICANE FORECASTS

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service  
8.0130 A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES

R.H. SIMPSON, U.S. Dept. of Commerce, Natl. Weather Service

8.0132 ATLANTIC HURRICANE FREQUENCIES  
ALONG THE U.S. COASTLINE

C.J. SONU, Louisiana State Univ. Systems, Coastal Studies Institute

8.0103 BEACH CHANGES BY EXTRAORDINARY  
WAVES CAUSED BY HURRICANE CAMILLE

H.B. STEWART, U.S. Dept. of Commerce, Environ. Research Laboratories

8.0065 SEA-AIR INTERACTION LABORATORY  
OPERATIONS

A.L. SUGG, U.S. Dept. of Commerce, Natl. Weather Service

8.0016 MEMORABLE HURRICANES OF THE UNITED  
STATES SINCE 1973

F.J. SWAYE, Univ. of Delaware, School of Arts

8.0002 COASTAL STORM DAMAGE WITH SPECIAL  
REFERENCE TO THE DELMARVA REGION OF  
DELAWARE, MARYLAND, VIRGINIA

I.C. TAILANT, U.S. Army, Waterways Experiment Station

8.0048 EFFECTS ON LAKE PONTCHARTRAIN, I.A., OF  
HURRICANE SURGE CONTROL STRUCTURES AND  
MISSISSIPPI RIVER-GULF OUTLET CHANNEL

H.C. THOM, U.S. Dept. of Commerce, Natl. Bureau of Standards

8.0078 WIND AND SURGE DAMAGE DUE TO HUR-  
RICANE CAMILLE

UNKNOWN, U.S. Exec. Office of the Pres., Off. of Emergency Preparedness

8.0001 THE FEDERAL RESPONSE TO TROPICAL  
STORM AGNES; A REPORT TO THE SENATE COM-  
MITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON  
DISASTER RELIEF

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

8.0004 FEDERAL PLAN FOR METEOROLOGICAL SER-  
VICES & SUPPORTING RESEARCH - FISCAL YEAR  
1974

UNKNOWN, State Res. & Dev. Center

8.0011 GRANT TO DESIGN A REBUILDING PLAN FOR  
GULFPORT, MISSISSIPPI, TO RESTORE THE  
DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II,  
& III (ABBREV)

UNKNOWN, State Res. & Dev. Center

8.0012 GRANT TO DESIGN A REBUILDING PLAN FOR  
GULFPORT, MISSISSIPPI, TO RESTORE THE  
DAMAGE OF HURRICANE CAMILLE, VOLUMES IV  
& V (ABBREV)

UNKNOWN, U.S. Coastal Bend Reg. Comm.

8.0015 HURRICANE CELIA REDEVELOPMENT

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

8.0020 NATIONAL HURRICANE OPERATION PLAN

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

8.0022 FINAL REPORT OF THE DISASTER SURVEY  
TEAM ON THE EVENTS OF AGNES

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

8.0023 THE HOMEPORT STORY - AN IMAGINARY  
CITY GETS READY FOR A HURRICANE

UNKNOWN, U.S. Army, Engineer District

8.0025 BAL. HARBOUR, FLORIDA PARTIAL BEACH  
RESTORATION, BEACH EROSION CONTROL AND  
HURRICANE PROTECTION PROJECT, DADE COUN-  
TY, FLORIDA

UNKNOWN, Miami Federal Executive Board

8.0026 EVACUATION OF COASTAL RESIDENTS DURING  
HURRICANES A PILOT STUDY FOR DADE  
COUNTY, FLORIDA

UNKNOWN, U.S. Army, Engineer District

8.0028 JEKYLL ISLAND, GEORGIA, BEACH EROSION  
CONTROL AND HURRICANE PROTECTION

UNKNOWN, U.S. Air Force, Air Weather Service

8.0029 WATER WARNINGS AND SPECIALIZED  
FORECASTS

UNKNOWN, U.S. Army, Engineer District

8.0030 GRAND ISLE, LOUISIANA, AND VICINITY  
HURRICANE PROTECTION ASSOCIATED WATER  
FEATURE, BAYOU LAFOURCHE - LOUISIANA (AB-  
BREV)

UNKNOWN, U.S. Army, Engineer District

8.0031 NEW ORLEANS TO VENICE, LOUISIANA, HUR-  
RICANE PROTECTION

UNKNOWN, U.S. Army, Engineer District

8.0032 LAKE PONTCHARTRAIN, LOUISIANA AND  
VICINITY - HURRICANE PROTECTION PROJECT

UNKNOWN, U.S. Army, Engineer District

8.0033 MORGAN CITY, LOUISIANA, AND VICINITY  
(FRANKLIN AND VICINITY AREA)

UNKNOWN, U.S. Army, New England Division

8.0034 HURRICANE PROTECTION PROJECT, STRAT-  
FORD, CONNECTICUT

UNKNOWN, U.S. Army, New England Division

8.0035 OPERATION AND MAINTENANCE OF NEW  
BEDFORD HURRICANE BARRIER, MASSACHUSETTS

UNKNOWN, U.S. Army, New England Division

8.0036 OPERATION AND MAINTENANCE OF NEW  
BEDFORD HURRICANE BARRIER, NEW BEDFORD,  
MASSACHUSETTS

UNKNOWN, U.S. Army, New England Division

8.0037 NEW LONDON HURRICANE PROTECTION  
PROJECT, NEW LONDON, CONNECTICUT

UNKNOWN, U.S. Army, Engineer District

8.0050 VIRGINIA BEACH, VIRGINIA - BEACH ERO-

8.0079 REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965

UNKNOWN, U.S. Natl. Aero. & Space Adm., John F. Kennedy Space Center

8.0083 HURRICANE PREPAREDNESS AND CONTROL PLAN

UNKNOWN, U.S. Dept. of Commerce, Natl. Hurricane Res. Lab

8.0095 PROJECT STORMFURY ANNUAL REPORT 1971

UNKNOWN, Ocean Data Systems Inc.

8.0105 EXTENDING THE COMPUTERIZED TYPHOON/TROPICAL STORM PREDICTION PROGRAM (TYPHOON 72) TOWARD SEVEN DAYS

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin

8.0107 HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY)

UNKNOWN, U.S. Dept. of the Interior, Geological Survey

8.0133 SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA

Y.K. WEN, Univ. of Illinois, School of Engineering

8.0101 PROBABILISTIC MODELING OF EXTREME LOADS

F.M. WHITE, Univ. of Rhode Island, School of Engineering

8.0126 ANALYTICAL PHYSICAL MODEL

L.D. WRIGHT, Louisiana State Univ. Systems, Coastal Studies Institute

8.0008 EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELEUR ISLAND CHAIN AND THE EASTERN PORTION OF THE LOWER MISSISSIPPI DELTA

C.Y. YANG, Univ. of Delaware, School of Marine Science

8.0070 STATISTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (ABBREV)

## LAND SLIDES

T.G. ABRAMS, Univ. of Texas, Ctr. For Highway Research

9.0023 A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS

J.T. ALFORE, State Div. of Mines & Geology

9.0007 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

I.A. ALNOURI, State Dept. of Highways

9.0016 SLOPE STABILITY OF CUTS IN ONTONAGON CLAY

E.E. BRABB, U.S. Dept. of the Interior, Geol. Survey

9.0027 SANTA CRUZ COUNTY COAL RESOURCES

E.E. BRABB, U.S. Dept. of the Interior, Geol. Survey

9.0028 EARTHQUAKE HAZARD RESEARCH IN THE SAN FRANCISCO BAY REGION

R.H. CAMPBELL, U.S. Dept. of the Interior, Geol. Survey

9.0029 GEOLOGY OF THE POINT LOMA AREA, SAN DIEGO AND THE LOS ANGELES CO. COOPERATIVE, CALIFORNIA

J.M. CATTERMOLLE, U.S. Dept. of the Interior, Geol. Survey

9.0041 GEOLOGY OF THE RAPID CREEK AREA, SOUTHERN DAKOTA

P.C. CLARK, State Highway Commission

9.0013 WATER DRAINAGE FROM THE SAN JOSE MOUNTAINS TO PREVENT OR HALT FILL

F.J. DAVIS, U.S. Dept. of the Interior, Bureau of Reclamation

9.0008 RIPRAP SLOPE PROTECTION PROCEDURES FOR DAMS - A REVIEW OF CURRENT PRACTICES

J. DENOYER, U.S. Natl. Aero. & Space Admin.

9.0050 REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY

T.W. DIBBLEE, U.S. Dept. of the Interior, Geol. Survey

9.0001 REGIONAL GEOLOGIC MAP OF THE SAN ANDREAS FAULT - CALIFORNIA

K.R. EVERETT, Ohio State University, School of Geology

9.0057 LANDSLIPS IN SOUTHEASTERN OHIO

R.A. FORSYTH, State Div. of Highways

9.0005 EARTHWORK REINFORCEMENT OF EROSION - LOS ANGELES AREA

R.A. FORSYTH, State Div. of Highways

9.0037 LIME SOIL STABILIZATION FOR ROAD CONSTRUCTION

R.L. FREDRIKSEN, U.S. Dept. of Agriculture, Agric. Res. & Ext. Sta.

9.0062 EROSION AND SEDIMENTATION IN ROAD CONSTRUCTION AND TIME-DEPENDENT STABILITY OF UNSTABLE SOILS IN THREE SOUTHERN OREGON WATERSHEDS

G. GOODWIN, U.S. Natl. Aero. & Space Admin., Research Center

9.0035 REMOTE SENSING FOR GEOLOGIC AND DISASTERS, MINE AREA COMPARISON, MAPPING AND LAND USE PLANNING

C.T. GORMAN, State Bur. of Highways

9.0015 LANDSLIDES - KENTUCKY

D.H. GRAY, Univ. of Michigan, School of Geology

9.0051 EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON

- D.H. GRAY**, Univ. of Michigan, School of Engineering  
9.0052 EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES
- H.G. GREENE**, U.S. Dept. of the Interior, Geological Survey  
9.0030 MONTEREY BAY - CALIFORNIA
- J.V. HAMEL**, Hamel Geotechnical Consultants  
9.0021 ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA
- J.H. HAVENS**, State Div. of Res.  
9.0014 INVESTIGATION OF LANDSLIDES ON HIGHWAYS
- C.J. HAYES**, State Dept. of Highways  
9.0019 SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS
- A.M. JOHNSON**, Stanford University, School of Earth Sciences  
9.0003 MOBILIZATION OF DEBRIS FLOWS 9973-EN
- D.M. KEADY**, State Geol. Survey  
9.0053 ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI
- P.F. KERR**, Columbia University, School of Arts  
9.0017 CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA
- P.F. KERR**, Columbia University, School of Arts  
9.0056 THE INFLUENCE OF CLAY MINERALS ON SURFICIAL EARTH MOVEMENTS
- D.K. KERR**, State Highway Department  
9.0018 INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE
- F.B. LEIGHTON**, Glendora City Government  
9.0026 ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLEN DORA, CALIFORNIA
- R.M. LINDVALL**, U.S. Dept. of the Interior, Geological Survey  
9.0042 DENVER METROPOLITAN AREA, COLORADO
- R. MEARNS**, State Div. of Highways  
9.0006 SUBAUDIBLE ROCK NOISE (SARN) AS A MEASURE OF SLOPE STABILITY, CALIFORNIA
- R. MEARNS**, State Materials & Res. Dept.  
9.0039 EVALUATION OF THE ION EXCHANGE LANDSLIDE CORRECTION TECHNIQUE
- R.H. MERRILL**, U.S. Dept. of the Interior, Bureau of Mines  
9.0009 LOCATION OF SLOPE FAILURE PLANES
- G. MESRI**, Univ. of Illinois, School of Engineering  
9.0012 STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS
- R.D. MILLER**, U.S. Dept. of the Interior, Geological Survey  
9.0043 SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA
- J.K. MITCHELL**, Univ. of California, School of Engineering  
9.0025 COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE PROTECTION FOR EARTH EMBANKMENTS
- W.F. NORELL**, State Dept. of Transportation  
9.0061 MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO
- T.W. OFFIELD**, U.S. Dept. of the Interior, Geological Survey  
9.0044 DENVER-FRONT RANGE URBAN CORRIDOR
- K.L. PIERCE**, U.S. Dept. of the Interior, Geological Survey  
9.0045 MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR
- G. PLAFKER**, U.S. Dept. of the Interior, Geological Survey  
9.0031 ALASKA GEOLOGIC EARTHQUAKE HAZARDS
- D.H. POOLE**, Univ. of California, School of Physical Sciences  
9.0036 DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA
- D.H. POOLE**, East Tenn. State University, Remote Sensing Institute  
9.0063 DEVELOPMENT OF CRITERIA FOR RECOGNIZING & IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED BY REMOTE SENSOR RETURNS - NORTH CAROLINA
- D.H. RADBRUCHHALL**, U.S. Dept. of the Interior, Geological Survey  
9.0002 REGIONAL SLOPE STABILITY STUDIES - CALIFORNIA AND PENNSYLVANIA
- J.F. REDLINGER**, U.S. Army, Missouri River Engr. Div.  
9.0054 ROCK STRENGTH FROM FAILURE CASES
- J. SCHLOCKER**, U.S. Dept. of the Interior, Geological Survey  
9.0032 GEOLOGY OF THE POINT BONITA QUADRANGLE, CALIFORNIA
- W.L. SCHROEDER**, Oregon State University, School of Engineering  
9.0020 FLOW SLIDE CONTROL WITH SLOPE REVETMENTS
- G.O. SCHWAB**, Ohio State University, School of Agriculture  
9.0059 STABILIZATION OF STEEP LAND SLOPES - OHIO
- J. SCULLY**, State Geol. Survey  
9.0022 LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO.1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE
- J.B. SEED**, Calif. Inst. of Technology, Graduate School  
9.0004 GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS
- J.F. SHRODER**, Univ. of Nebraska, School of Arts  
9.0055 TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH



## LAND SLIDES

- L.W. SMITH, State Div. of Highways  
9.0038 EVALUATION OF 'ION EXCHANGE' LAND-SLIDE CORRECTION TECHNIQUE - CALIFORNIA
- W.C. SMITH, State Geol. Survey  
9.0011 ENGINEERING GEOLOGY - ILLINOIS
- D.N. SWANSTON, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta.  
9.0024 MECHANICS OF DEBRIS AVALANCHING IN SHALLOW HILL SOILS OF SOUTHEAST ALASKA
- UNKNOWN, Transportation Res. Board  
9.0010 SHEAR STRENGTH OF FINE-GRAINED SOILS - WEST POINT, NEW YORK
- UNKNOWN, U.S. Dept. of the Interior, Bureau of Reclamation  
9.0047 EVALUATION OF CRITERIA FOR LANDSLIDE ANALYSIS AS PRESENTED IN THE U.S.G.S.
- UNKNOWN, U.S. Dept. of the Interior, Geological Survey  
9.0049 PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY
- H.C. WAGNER, U.S. Dept. of the Interior, Geological Survey  
9.0033 ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA
- J.D. WELLS, U.S. Dept. of the Interior, Geological Survey  
9.0048 HAMILTON 2 DEGREE
- T.H. WU, Ohio State University, School of Engineering  
9.0060 ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO
- R.F. YERKES, U.S. Dept. of the Interior, Geological Survey  
9.0034 MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE TOPANGA QUADRANGLE, LOS ANGELES COUNTY COOPERATIVE, CALIFORNIA

## LAND SUBSIDENCE

- J.T. ALFORE, State Div. of Mines & Geology  
10.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)
- E.R. BATES, U.S. Army, Waterways Experiment Station  
10.0009 DETECTION OF SUBSURFACE OPENINGS - INDIANA, MISSOURI
- L.A. BEYER, U.S. Dept. of the Interior, Geological Survey  
10.0015 MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA
- C.C. CALHOUN, U.S. Army, Waterways Experiment Station  
10.0030 VERIFICATION OF EMPIRICAL METHOD OF DETERMINING SUBSIDENCE

INVEST

- A.E. COKER, U.S. Dept. of the Interior, Geol. Survey  
10.0029 REMOTE SENSING, ALFA RIVER BASINS, FLORIDA
- A.P. DELFLACHE, Lamar University, School of Geology  
10.0032 CONTROL OF LAND SUBSIDENCE - TEXAS GULF COAST AREA
- C.R. DUNRUD, U.S. Dept. of the Interior, Geol. Survey  
10.0004 COAL MINE DEFORMATION - SOMERSET, COLORADO
- D.Q. FLETCHER, U.S. Dept. of the Interior, Geol. Survey  
10.0005 DEVELOP METHODS FOR IDENTIFYING COMPONENTS OF GROUND MOTION - MINE WORKINGS
- R.K. GABRYSCII, U.S. Dept. of the Interior, Geol. Survey  
10.0011 LAND-SURFACE SUBSIDENCE - AREA, TEXAS
- R.K. GABRYSCII, U.S. Dept. of the Interior, Geol. Survey  
10.0012 LAND-SURFACE SUBSIDENCE AND SEABROOK AREAS, TEXAS
- W.R. HANSEN, U.S. Dept. of the Interior, Geol. Survey  
10.0020 DENVER URBAN CORRIDOR - COLORADO
- J.G. JACKSON, U.S. Army, Waterways Experiment Station  
10.0010 STUDY OF GROUND SUBSIDENCE LIQUEFACTION AS A MECHANISM OF MILITARY INSTALLATIONS
- D.M. KEADY, Mississippi St. University, School of Geology  
10.0008 STATUS OF LAND SUBSIDENCE - GROUND-WATER WITHDRAWAL IN MISSISSIPPI
- R.W. LEMKE, U.S. Dept. of the Interior, Geol. Survey  
10.0021 ENGINEERING GEOLOGY RESEARCH STUDIES OF COASTAL COMMUNITIES - TEXAS
- R.I. LEWELLEN, Arctic Inst. of North America  
10.0025 STUDIES ON THE FLUVIAL PROCESSES OF ARCTIC COASTAL PLAIN PROVINCE - ALASKA VOLUME I
- B.E. LOFGREN, U.S. Dept. of the Interior, Geol. Survey  
10.0017 SUBSIDENCE AND RELATED GEOTHERMAL SYSTEMS
- T.A. MORGAN, U.S. Dept. of the Interior, Geol. Survey  
10.0022 DEVELOP DESIGN CRITERIA FOR SALT-DOME DEPOSITS TO MINIMIZE SUBSIDENCE
- R.D. MUNSON, U.S. Dept. of the Interior, Geol. Survey  
10.0006 MICROSEISMIC DETERMINATION OF MINE ENTRY STABILITY
- J.G. NEWTON, U.S. Dept. of the Interior, Geol. Survey

**G. PLAFKER**, U.S. Dept. of the Interior, Geological Survey  
10.0016 ALASKA GEOLOGIC EARTHQUAKE  
HAZARDS

**J.F. POLAND**, U.S. Dept. of the Interior, Geological Survey  
10.0018 LAND-SUBSIDENCE STUDIES IN CALIFORNIA  
- TO STUDY THE EXTENT, MAGNITUDE R

**J.F. POLAND**, U.S. Dept. of the Interior, Geological Survey  
10.0019 LAND SUBSIDENCE STUDIES IN THE SAN  
JOAQUIN VALLEY - CALIFORNIA

**J.B. SEED**, Calif. Inst. of Technology, Graduate School  
10.0002 GENERAL REVIEW OF THE SEISMIC  
HAZARD TO SELECTED U.S. NAVY INSTALLATIONS

**W.J. TESCH**, U.S. Dept. of the Interior, Bureau of Mines  
10.0023 ESTABLISH TECHNIQUES FOR MONITORING  
SURFACE SUBSIDENCE OVER MINED AREAS

**W.L. TROCK**, Texas A & M University System, School of  
Agriculture  
10.0001 COSTS OF LAND SUBSIDENCE IN THE  
HOUSTON-GALVESTON AREA, TEXAS

**UNKNOWN**, Unknown Inst. or Indiv. Grant  
10.0033 DEMONSTRATION OF A TECHNIQUE FOR  
LIMITING THE SUBSIDENCE OF LAND OVER ABAN-  
DONED MINES ROCK SPRINGS, WYOMING

**B.G. VOLK**, Agric. Res. & Educ. Center  
10.0028 SUBSIDENCE INVESTIGATIONS ON ORGANIC  
SOILS

**C. WINIKKA**, State Highway Department  
10.0014 ARIZONA EARTH FISSURE INVESTIGATION

**A.G. WINSLOW**, U.S. Dept. of the Interior, Geological Survey  
10.0013 CONTINUING QUANTITATIVE GROUND-  
WATER STUDIES IN THE HOUSTON DISTRICT

**F.D. WRIGHT**, Univ. of Kentucky, School of Engineering  
10.0007 ROCK MECHANICS STUDY OF SHORTWALL  
MINING - KENTUCKY

**W.N. YOUNGS**, U.S. Dept. of the Interior, Bureau of Mines  
10.0024 MEASUREMENT AND EVALUATION OF SUB-  
SIDENCE OVER A COAL MINE WITH VARYING  
OVERBURDEN THICKNESS

## **SNOWSTORMS**

**J.T. ALFORE**, State Div. of Mines & Geology  
11.0001 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)

**R.W. HARMS**, U.S. Dept. of Commerce, Natl. Weather Service  
11.0005 SNOW FORECASTING FOR SOUTHEASTERN  
WISCONSIN

**A.I. MCCONE**, M B Associates

11.0002 SNOW AND ICE DETECTION AND WARNING  
SYSTEMS

**M.E. MILLER**, U.S. Dept. of Commerce, Weather Bureau  
11.0009 FREQUENCY AND INTENSITY OF FREEZING  
RAIN/DRIZZLE IN OHIO

**B.L. NELSON**, U.S. Dept. of Commerce, Natl. Weather Service  
11.0006 A SYNOPTIC CLIMATOLOGY FOR  
SNOWSTORMS IN NORTHWESTERN NEVADA

**R.D. TABLER**, Rocky Mtn. Forest & Range Sta.  
11.0008 DETERMINATION OF SNOW FENCE DESIGN  
CRITERIA, AND DEVELOPMENT OF A HANDBOOK  
FOR SNOW CONTROL

**UNKNOWN**, U.S. Dept. of Commerce, Natl. Oceanic & At-  
mos. Admin.

11.0004 NATIONAL EAST COAST WINTER STORMS  
OPERATIONS PLAN

**H.K. WEICKMANN**, U.S. Dept. of Commerce, Atmospheric  
Phys. & Chem. Lab.

11.0003 THE MODIFICATION OF GREAT LAKES  
WINTER STORMS

## **TORNADOES**

**J.T. ALFORE**, State Div. of Mines & Geology  
12.0011 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)

**S.L. BARNES**, U.S. Dept. of Commerce, Natl. Severe Storms  
Lab.

12.0007 MORPHOLOGY OF TWO TORNADIC STORMS  
- AN ANALYSIS OF NSSL DATA ON APRIL 30, 1970 -  
OKLAHOMA CITY, OKLAHOMA

**S.L. BARNES**, U.S. Dept. of Commerce, Environ. Research  
Laboratories

12.0023 SEVERE STORM MORPHOLOGY -  
OKLAHOMA

**S.L. BARNES**, U.S. Dept. of Commerce, Environ. Research  
Laboratories

12.0024 PAPERS ON OKLAHOMA THUNDERSTORMS,  
APRIL 29-30, 1970

**S.A. CHANGNON**, State Water Survey  
12.0017 DENSE RAIN GAGE NETWORK PROJECTS -  
ILLINOIS

**S.A. CHANGNON**, State Water Survey  
12.0032 STUDY OF URBAN EFFECTS ON PRECIPITA-  
TION AND SEVERE WEATHER AT ST. LOUIS - IL-  
LINOIS

**J.R. COOLEY**, U.S. Dept. of Commerce, Natl. Weather Ser-  
vice

12.0036 TORNADOES IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967

C.G. CULVER, U.S. Dept. of Commerce, Natl. Bureau of Standards

12.0001 DISASTER INVESTIGATIONS

W.E. FINLEY, U.S. Air Force, Environ. Tech. Appl. Center

12.0003 THE OCHELTREE TORNADO - A CASE STUDY - MISSOURI

T.T. FUJITA, Univ. of Chicago, School of Physical Sciences

12.0030 ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON

T.T. FUJITA, Univ. of Chicago, School of Physical Sciences

12.0031 PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY

R.A. GENTRY, U.S. Atomic Energy Commission, Los Alamos Scientific Lab

12.0019 NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS

J.H. GOLDEN, U.S. Dept. of Commerce, Environ. Research Laboratories

12.0025 LIFE CYCLE OF FLORIDA KEYS' WATER-SPOUTS

J.H. GOLDEN, U.S. Dept. of Commerce, Natl. Severe Storms Lab

12.0039 SOME STATISTICAL ASPECTS OF WATER-SPOUT FORMATION - FLORIDA

H. GORDON, U.S. Dept. of Commerce, Natl. Weather Service

12.0037 DAILY TORNADO FREQUENCIES FOR THE CONTIGUOUS UNITED STATES

R.E. HALLGREN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0012 NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN

F.A. HUFF, State Water Survey

12.0033 HYDROMETEOROLOGICAL ANALYSIS OF SEVERE RAINSTORMS - ILLINOIS

R.S. INGRAM, U.S. Dept. of Commerce, Natl. Weather Service

12.0010 ARIZONA 'EDDY' TORNADOES

E. KESSLER, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

12.0021 TORNADOES

R.M. LHERMITTE, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0026 DOPPLER RADAR METHODOLOGY FOR THE OBSERVATION OF CONVECTIVE STORMS

M.E. MILLER, U.S. Dept. of Commerce, Weather Bureau

12.0020 SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUNDERSTORM AND TORNADO

12.0002 TORNADO - THE VOICE OF DISASTER AND AFTER - A STUDY IN INTEGRATION - TEXAS-(LUBBOCK?)

J.E. MINOR, Texas Technological University, Engineering

12.0040 IMPACT OF THE LUBBOCK REGIONAL SYSTEMS - TEXAS

G. MORGAN, State Water Survey

12.0034 STUDY OF THE SYNOPTIC OF NORTH AMERICA

D.J. NOVLAN, Colorado State University, Seismology

12.0028 HURRICANE SPAWNED TORNADOES

J.W. REED, Mass. Inst. of Technology, School of Engineering

12.0018 WIND-INDUCED MOTION DISCOMFORT IN TALL BUILDINGS

N.F. SOMES, U.S. Dept. of Commerce, Building Research Laboratories

12.0004 LUBBOCK TORNADO - A SURVEY OF DAMAGE IN AN URBAN AREA - TEXAS

W. TAYLOR, U.S. Dept. of Commerce, Environmental Research Laboratories

12.0027 EM RADIATION-TORNADOES

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0005 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - YEAR 1974

UNKNOWN, Xenia Commission

12.0006 XENIA REBUILDS

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0013 NATIONAL EAST COAST WIND STORM OPERATIONS PLAN

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0014 NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN - 1974

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

12.0015 MISSISSIPPI DELTA TORNADO - FEBRUARY 21, 1971 - A REPORT TO THE TORNADO TRATOR

UNKNOWN, U.S. Air Force, Air Weather Service

12.0016 WATER WARNINGS AND FORECASTS

UNKNOWN, Tetra Tech Incorporated

12.0041 COMPUTER SIMULATION OF TORNADO STORM OBSERVATIONS WITH DOPPLER

**J.V. VAIKSNORAS**, U.S. Dept. of Commerce, Natl. Weather Service

**12.0009** TORNADOES IN TENNESSEE (1916-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880-1970)

**C.L. VLCEK**, U.S. Dept. of Commerce, Natl. Severe Storms Lab.

**12.0022** OBSERVATIONS OF SEVERE STORMS ON 26 AND 28 APRIL 1971

**A.W. WATERS**, U.S. Air Force, Air Weather Service

**12.0029** FORECASTING GUSTY SURFACE WINDS IN THE CONTINENTAL UNITED STATES

**Y.K. WEN**, Univ. of Illinois, School of Engineering

**12.0035** PROBABILISTIC MODELING OF EXTREME LOADS

## TSUNAMIS

**J.T. ALFORE**, State Div. of Mines & Geology

**13.0003** URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

**S.T. ALGERMISSEN**, U.S. Dept. of Commerce, Environ. Research Laboratories

**13.0004** TSUNAMI RESEARCH

**J.E. CLARK**, U.S. Dept. of the Interior, Geological Survey

**13.0011** TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA

**D.C. COX**, Univ. of Hawaii, School of Arts

**13.0021** PACIFIC TSUNAMI CATALOG

**L. HWANG**, Tetra Tech Incorporated

**13.0015** TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS

**A.M. KAMEL**, U.S. Army, Waterways Experiment Station

**13.0009** STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION

**G.H. KEULEGAN**, U.S. Army, Waterways Experiment Station

**13.0026** THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL

**G.H. KEULEGAN**, U.S. Army, Waterways Experiment Station

**13.0027** A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL

**R.W. LEMKE**, U.S. Dept. of the Interior, Geological Survey

**13.0017** ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA

**C.L. MADER**, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

**13.0020** NUMERICAL SIMULATION OF TSUNAMIS

**J.W. MILES**, Univ. of California, Inst. of Geophys. & Pl. Phys.

**13.0016** NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES

**G.R. MILLER**, U.S. Dept. of Commerce, Environ. Research Laboratories

**13.0005** TSUNAMI RESEARCH

**G.R. MILLER**, Univ. of Hawaii, Hawaii Inst. of Geophysics

**13.0022** RELATIVE SPECTRA OF TSUNAMIS

**N.R. OSWALT**, U.S. Army, Waterways Experiment Station

**13.0010** STEADY-FLOW STABILITY TESTS OF NAVIGATION OPENING STRUCTURES, HILO HARBOR, TSUNAMI BARRIER, HILO, HAWAII - HYDRAULIC MODEL INVESTIGATION

**C. PETRAUSKAS**, Univ. of California, School of Engineering

**13.0001** FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA

**G. PLAFKER**, U.S. Dept. of the Interior, Geological Survey

**13.0013** ALASKA GEOLOGIC EARTHQUAKE HAZARDS

**R.W. PREISENDORFER**, Univ. of Hawaii, Hawaii Inst. of Geophysics

**13.0023** RECENT TSUNAMI THEORY

**T.C. ROYER**, Univ. of Alaska, Inst. of Marine Sciences

**13.0012** EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA

**J.B. SEED**, Calif. Inst. of Technology, Graduate School

**13.0002** GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS

**M.G. SPAETH**, U.S. Dept. of Commerce, Natl. Ocean Survey

**13.0007** WAVE REPORTING PROCEDURES FOR TIDE OBSERVERS IN THE TSUNAMI WARNING SYSTEM

**UNKNOWN**, U.S. Dept. of the Interior

**13.0006** TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V

**UNKNOWN**, U.S. Dept. of Commerce, Natl. Ocean Survey

**13.0008** TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION

**UNKNOWN**, U.S. Army, Coastal Engin. Res. Center

**13.0019** LONG-PERIOD WAVES AND SURGES

**UNKNOWN**, U.S. Dept. of Commerce, Natl. Ocean Survey

**13.0025** THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS

**E. VARLEY**, Lehigh University, Ctr. For the Appl. of Math.

**13.0029** THE PROPAGATION OF LARGE AMPLITUDE TSUNAMIS ACROSS A BASIN OF CHANGING DEPTH - OFF-SHORE BEHAVIOR

G.P. WOOLLARD, Univ. of Hawaii, Hawaii Inst. of Geophysics  
14.0024 TSUNAMI SHORELINE TRACT

## VOLCANOES

J.T. ALFORE, State Div. of Mines & Geology  
14.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)

D.R. CRANDELL, U.S. Dept. of the Interior, Geological Survey  
14.0007 VOLCANIC HAZARDS IN THE CASCADE  
RANGE - CALIFORNIA AND WASHINGTON

J.B. FINLAYSON, Univ. of Hawaii, Water Resources Research  
Ctr  
14.0015 RAINWATER CONTAMINATION BY VOL-  
CANIC VOLATILES FROM KILAUEA VOLCANO,  
HAWAII (PHASE I)

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey  
14.0008 THERMAL SURVEILLANCE OF VOLCANOES -  
REMOTE SENSING OF LONG VALLEY IN GEOTHER-  
MAL PROGRAM - WASHINGTON, OREGON AND  
CALIFORNIA

J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey  
14.0009 THERMAL SURVEILLANCE OF ACTIVE VOL-  
CANOES

J. KIENLE, Univ. of Alaska, Geophysical Institute  
14.0005 SEISMIC SURVEILLANCE OF AUGUSTINE RE-  
DOUBT AND SPURR VOLCANOES, COOK INLET,  
ALASKA

D.R. MULLINEAUX, U.S. Dept. of the Interior, Geological  
Survey  
14.0001 VOLCANIC HAZARDS ON THE ISLANDS OF  
HAWAII

D.R. MULLINEAUX, U.S. Dept. of the Interior, Geological  
Survey  
14.0010 VOLCANIC HAZARDS, ISLAND OF HAWAII

S.S. ORIEL, U.S. Dept. of the Interior, Geological Survey  
14.0011 EASTERN SNAKE RIVER PLAIN REGION IN-  
VESTIGATIONS - IDAHO

D.W. PETERSON, U.S. Dept. of the Interior, Geological Sur-  
vey  
14.0004 HAWAIIAN VOLCANO OBSERVATORY

D. SCHLEICHER, U.S. Dept. of the Interior, Geological Sur-  
vey  
14.0012 SNAKE RIVER PLAIN, PART E - NORTH CEN-  
TRAL - IDAHO

R.L. SMITH, U.S. Dept. of the Interior, Geological Survey  
14.0014 REGIONAL VOLCANOLOGY - WESTERN  
UNITED STATES INCLUDING ALASKA AND HAWAII

D.A. SWANSON, U.S. Dept. of the Interior, Geological Survey  
14.0006 GEODIMETER STUDIES OF CASCADE VOL-  
CANOES - WASHINGTON, OREGON AND CALIFOR-  
NIA

P.L. WARD, U.S. Dept. of the Interior, Geological Survey  
14.0002 SATELLITE VOLCANO SURVEILLANCE -  
ALASKA, HAWAII AND WASHINGTON

P.L. WILLIAMS, U.S. Dept. of the Interior, Geological Survey  
14.0013 SNAKE RIVER PLAIN, PART B - VOLCANIC  
ROCKS - IDAHO

## WATER EROSION

J.T. ALFORE, State Div. of Mines & Geology  
15.0003 URBAN GEOLOGY PLAN FOR CALIFORNIA -  
THE NATURE, MAGNITUDE, & COSTS OF GEOLOG-  
IC HAZARDS & RECOMMENDATIONS FOR THEIR  
MITIGATION (ABBREV)

J.M. ARMSTRONG, Univ. of Michigan, School of Engineering  
15.0026 COASTAL ZONE AND SHORFLANDS  
MANAGEMENT - GREAT LAKES

K. ARULANANDAN, Univ. of California, School of Engineer-  
ing  
15.0012 HYDRAULIC EROSION OF SOILS

L.L. BRAIDECCH, State Div. of Geolog. Survey  
15.0030 SHORE EROSION STUDY OF ERIE COUNTY,  
OHIO

L.L. BRAIDECCH, State Div. of Geolog. Survey  
15.0031 SHORE EROSION STUDY OF LAKE COUNTY,  
OHIO

J.V. BYRNE, Oregon State University, School of Science  
15.0033 EVALUATION OF GEOLOGIC AND OCEANO-  
GRAPHIC FACTORS INFLUENCING EROSION OF  
THE OREGON COAST

C.H. CARTER, State Div. of Geolog. Survey  
15.0032 SHORE EROSION STUDIES ALONG THE OHIO  
SHORE OF LAKE ERIE

D.R. COATES, State University of New York, School of Arts  
15.0027 ENVIRONMENTAL GEOMORPHIC STUDY OF  
THE COASTAL REGIMES ALONG THE SOUTH  
SHORE OF LONG ISLAND - NEW YORK

R.A. DAVIS, Williams College, Graduate School  
15.0024 SIMULATION MODEL FOR STORM CYCLES  
AND BEACH EROSION ON LAKE MICHIGAN

C. EMILIANI, Univ. of Miami, School of Marine Science  
15.0017 A STUDY OF NEARSHORE PROCESSES IN  
SOUTHEAST FLORIDA

P. FAN, Univ. of Hawaii, Water Resources Research Ctr.  
15.0018 DEPOSITION OF HAWAIIAN WATERSHED  
AND ESTUARINE SEDIMENTS

**15.0025** PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN

**R.L. FREDRIKSEN**, U.S. Dept. of Agriculture, Pac. N.W. For. & Rg. Exp. Sta.

**15.0034** EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS

**J.V. HALL**, U.S. Army, Coastal Engin. Res. Center

**15.0004** CONCRETE BLOCK REVETMENT NEAR BENEDICT, MARYLAND

**M.O. HAYES**, Univ. of Massachusetts, Coastal Research Center

**15.0022** OFFSET COASTAL INLETS - FORMS OF SEDIMENT ACCUMULATION IN THE BEACH ZONE - ALASKA, NEW ENGLAND

**J.D. HUME**, Arctic Inst. of North America

**15.0014** SHORT-TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA

**R.E. HUNTER**, U.S. Dept. of the Interior, Geological Survey

**15.0037** TEXAS BARRIER ISLANDS

**R.L. INGRAM**, Univ. of North Carolina, School of Arts

**15.0029** EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST

**C.A. KAYE**, U.S. Dept. of the Interior, Geological Survey

**15.0023** SEA-CLIFF EROSION STUDIES, MASSACHUSETTS

**C. MASON**, Texas A & M University System, Graduate School

**15.0035** PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET

**D. MCCULLOCH**, U.S. Dept. of the Interior, Geological Survey

**15.0013** SAN FRANCISCO BAY

**A.J. MEHTA**, Univ. of Florida, School of Engineering

**15.0005** KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA

**T. OMHOLT**, New York Ocean Science Lab.

**15.0028** GROIN STUDY ON THE NORTH SHORE OF SUFFOLK COUNTY, LONG ISLAND, NEW YORK, BETWEEN ORIENT POINT AND PORT JEFFERSON HARBOR

**J.A. PURPURA**, Univ. of Florida, School of Engineering

**15.0016** COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS

**R.M. RICE**, U.S. Dept. of Agriculture, Pac. S.W. For. & Rg. Exp. Sta.

**15.0002** FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST

**15.0036** INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS

**A.S. TETELMAN**, Univ. of California, School of Engineering

**15.0001** COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION

**UNKNOWN**, U.S. Army, Engineer District

**15.0006** BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA

**UNKNOWN**, U.S. Army, Engineer District

**15.0007** JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION

**UNKNOWN**, U.S. Army, Engineer District

**15.0009** STATEN ISLAND BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, STATEN ISLAND, NEW YORK

**UNKNOWN**, U.S. Army, Engineer District

**15.0010** BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE

**UNKNOWN**, U.S. Army, Engineer District

**15.0011** VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION

**UNKNOWN**, U.S. Army, Coastal Engin. Res. Center

**15.0015** COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA

**UNKNOWN**, U.S. Army, North Central Division

**15.0019** NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT

**UNKNOWN**, U.S. Army, Engineer District

**15.0021** NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION

**UNKNOWN**, U.S. Dept. of the Interior, Geological Survey

**15.0039** SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA

**W.P. WAGNER**, Univ. of Vermont, State Resources Res. Center

**15.0038** ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT

**J.A. WILSON**, Iowa State University, Water Resources Research Inst.

**15.0008** PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDFLATS' IN IOWA'S LARGE RESERVOIR SYSTEMS

## **MULTIPLE HAZARDS**

**A.J. ABERSMAN**, System Development Corporation

16.0038 URBAN GEOLOGY - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

D. ARMSTRONG, Tri Cities Seismic Safe Study

16.0058 THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN

T.R. ARMSTRONG, Amer. Inst. For Res

16.0078 LABORATORY STUDIES OF THE EFFECTS OF PHYSICAL HAZARD ON SHELTER MANAGEMENT BEHAVIOR - PHASE I - STUDY PLAN

M.B. BADENHOP, Univ. of Tennessee, Agricultural Experiment Sta

16.0021 MANAGEMENT OF INSURABLE RISK

J.R. BARNARD, Iowa State University, Water Resources Research Inst

16.0084 ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE

F.R. BARTLEY, Tampa Bay Regional Plan. Coun.

16.0080 SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS

R.H. BLACK, U R S Systems Corporation

16.0027 IMPROVISING ELECTRIC POWER FROM INDUCTION GENERATORS DURING PROLONGED POWER OUTAGES

J. BLACKWELL, State Dept. of Community Affs.

16.0093 RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969

D.A. BROCK, Dallas Water Utilities Dept.

16.0105 METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER

J.M. BROOKS, Ohio State University, Disaster Research Center

16.0097 THE POLICE DEPARTMENT IN NATURAL DISASTER OPERATIONS

J.M. BROWN, George Washington University, Prog. of Pol. Stud Sci Tech.

16.0004 PROBING THE LAW AND BEYOND - A QUEST FOR PUBLIC PROTECTION FROM HAZARDOUS PRODUCT CATASTROPHES

F.R. CAMP, U.S. Army, Medical Research Laboratory

16.0007 MILITARY BLOOD BANKING (CIVIL DISASTERS)

R.C. CHASE, Ohio State University, School of Medicine

16.0016 ANALYSIS OF EMERGENCY MEDICAL SERVICES COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL SUBDIVISIONS

J.E. CLARK, Mississippi St. University, School of Engineering

16.0013 COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES

J.L. COSTANZA, Serendipity Incorporated

16.0052 THE DEVELOPMENT OF A TESSING EMERGENCY MEDICAL

W.R. CRAWFORD, U.S. Navy, Air Test C

16.0010 SEARCH AND RESCUE C  
GLOBAL RESCUE ALARM NET (G

P. DERGARABEDIAN, T R W Incorporated

16.0057 ON ESTIMATION OF M  
SPEEDS IN TORNADOES AND HUR

R.R. DYNES, Ohio State University, Disast

16.0098 A PERSPECTIVE ON DISAS

R.H. EMERY, U.S. Dept. of Transportation  
Administration

16.0031 EVALUATION OF EMI  
SYSTEMS

W.L. FISHER, Univ. of Texas, Bureau of I

16.0104 ENVIRONMENTAL GEOL  
THE TEXAS COASTAL ZON  
HOUSTON AREA

B. GONEN, Univ. of Washington, School o

16.0109 BUILDING STANDARDS  
EARTHQUAKE HAZARD FOR TI  
BASIN

C.E. GOSHEN, Urban Obs. of Met. Nashv

16.0023 DESIGN TO ESTABLISH A  
FOR EMERGENCY MEDICAL  
METROPOLITAN NASHVILLE-MID  
REGION

C.T. GRIFFIN, Iowa State University, Schu

16.0085 AN ANALYSIS OF OPERA  
EFFECTIVENESS - FOCUS ON TH  
LOCAL COORDINATORS

J.E. HAAS, Univ. of Colorado, School of A

16.0028 ASSESSMENT OF RESEAR  
HAZARDS

J.E. HAAS, Univ. of Colorado, Graduate S

16.0061 A COMPARATIVE ANALYS  
PORT OF AND RESISTANCE TO M  
CATION PROJECTS

W.F. HAMILTON, Univ. of Pennsylvania,

16.0018 SYSTEMS ANALYSIS OF E  
DELIVERY

R.C. HARKER, System Development Corp

16.0060 DEVELOPMENT OF IMPRO  
OPERATIONS SIMULATION T  
TRAINING PROCEDURES

G.F. HEIN, U.S. Natl. Aero. & Space A  
Center

16.0047 A DIGITAL SIMULATION O  
FIC FOR NATURAL DISASTER WA  
CATIONS SATELLITE

- A.T. HORTON**, U.S. Dept. of Commerce, Natl. Bureau of Standards  
16.0042 EMERGENCY EQUIPMENT STANDARDS
- F.A. HUFF**, State Water Survey  
16.0082 CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I
- R.W. KATES**, Clark University, Graduate School  
16.0094 COLLABORATIVE RESEARCH ON NATURAL HAZARDS
- C.L. KEENER**, Unknown Inst. or Individ. Grant  
16.0002 CONSULTATIVE PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN RAPID CITY, SOUTH DAKOTA
- R.C. KOCH**, Geomet Incorporated  
16.0045 SUMMARY REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971
- R.L. LAMOUREUX**, System Development Corporation  
16.0039 IMPROVED OUTDOOR ALERTING AND WARNING
- R.J. MARSHAK**, Human Sciences Research Inc.  
16.0108 AREA-WIDE DISASTER RESPONSE - CIVIL PREPAREDNESS AND REGIONAL COUNCILS
- D. MCCONNAUGHEY**, Natl. Acad. of Sciences  
16.0029 A NATIONWIDE PROGRAM TO DEVELOP REGIONAL EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS
- B.F. MCLUCKIE**, Ohio State University, Disaster Research Center  
16.0099 THE WARNING SYSTEM IN DISASTER SITUATIONS - A SELECTIVE ANALYSIS
- C.L. MULFORD**, Iowa State University, School of Science  
16.0086 ROLE PERFORMANCE IN THE OPERATING SYSTEM - CIVIL DEFENSE OPERATIONS IN DISASTER
- C.L. MULFORD**, Iowa State University, School of Science  
16.0087 SECURING COMMUNITY RESOURCES FOR SOCIAL ACTION
- C. MUNDO**, U.S. Dept. of Transportation, Transportation Systems Center  
16.0032 NATIONAL SEARCH AND RESCUE TELECOMMUNICATION SYSTEM PLAN (PINSARS)
- D.R. NICHOLS**, U.S. Dept. of the Interior, Geological Survey  
16.0054 ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT
- D.R. NICHOLS**, U.S. Dept. of the Interior, Geological Survey  
16.0074 SEISMIC HAZARDS AND LAND-USE PLANNING
- E.H. PAMPEYAN**, U.S. Dept. of the Interior, Geological Survey  
16.0055 GEOLOGIC ENVIRONMENTAL MAPS FOR LAND-USE PLANNING, CALIFORNIA
- D.E. PAULEY**, Gautney & Jones Comm. Inc.  
16.0107 EXPEDIENT AM AND FM BROADCAST ANTENNAS
- D.G. PENTERMAN**, State Off. of the Adj. Gen.  
16.0014 CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20)
- H. PLAAS**, Univ. of Tennessee, School of Liberal Arts  
16.0022 EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES -- EMERGENCY MEDICAL SERVICES
- R.L. PYLE**, U.S. Dept. of Commerce, Natl. Environ. Satellite Serv.  
16.0067 WEATHER SATELLITE CAPABILITIES - PRESENT AND FUTURE
- E.L. QUARANTELLI**, Ohio State University, Disaster Research Center  
16.0049 INITIAL OBSERVATIONS ON PROBLEMS AND DIFFICULTIES IN THE USE OF LOCAL EOC'S IN NATURAL DISASTERS
- E.L. QUARANTELLI**, Ohio State University, School of Social Science  
16.0100 ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES
- W.L. QUINN**, U.S. Army, Land Warfare Laboratory  
16.0008 BODY RECOVERY DOG
- C.T. RAINEY**, Stanford Research Institute  
16.0053 NATURAL DISASTER OPERATIONS PLANNING
- D. RICHARD**, Univ. of Denver, Graduate School  
16.0062 UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS
- J.L. ROSS**, Ohio State University, Disaster Research Center  
16.0017 THE SALVATION ARMY - ITS STRUCTURE, OPERATIONS, AND PROBLEMS IN DISASTERS
- E.J. RUSH**, U.S. Army, War College  
16.0101 DISASTER RELIEF - DOMESTIC ACTION IN THE SPOTLIGHT
- G.T. SAV**, U.S. Dept. of Commerce, Natl. Bureau of Standards  
16.0030 NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS
- SKOG**, State Highway Department  
16.0035 NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES



L.C. THOMAS, Stanford Research Institute

16.0001 EMERGENCY OPERATIONS SYSTEMS DEVELOPMENT - CIVIL DEFENSE RESCUE PHASE II

UNKNOWN, Dunlap & Associates Inc.

16.0003 DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION

UNKNOWN, U.S. Exec. Office of the Pres., Off. of Emergency Preparedness

16.0005 THE FEDERAL RESPONSE TO TROPICAL STORM AGNES: A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF

UNKNOWN, U.S. Dept. of Hlth. Ed. & Wel., P.H.S. Hlth. Serv. & M.H. Adm.

16.0011 PUBLIC HEALTH SERVICE DISASTER ASSISTANCE REPORT JULY 1967-JUNE 1970

UNKNOWN, State Dept. of Health

16.0012 HELICOPTER AMBULANCE SERVICE TO EMERGENCIES

UNKNOWN, Beukers Laboratories Inc.

16.0015 DEVELOPMENT OF A DISTRESS ALERTING AND LOCATING SYSTEM (DALIS) FOR SEARCH AND RESCUE MISSION

UNKNOWN, Univ. of Pennsylvania, School of Commerce

16.0019 RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID

UNKNOWN, Western Health Systems Inc.

16.0020 TRAINING PROGRAM FOR CRISIS INTERVENORS

UNKNOWN, State Div. of Mines & Geology

16.0025 URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV)

UNKNOWN, Luzerne Co. Transp. Authority

16.0034 DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER

UNKNOWN, Hughes Aircraft Company

16.0036 PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM SERVING THE EMERGENCY SERVICE DEPARTMENTS OF THE CITY OF LOS ANGELES (ABBREV)

16.0043 ESSA AND OPERATION FORESIGHT

UNKNOWN, U.S. Dept. of Commerce, National Weather Service

16.0046 FEDERAL PLAN FOR WEATHER RAINFALL

UNKNOWN, U.S. Natl. Aero. & Space Adm., Lewis Research Center

16.0048 DISASTER WARNING SATELLITE SYSTEM

UNKNOWN, Unknown Inst. or Indiv. Grant

16.0050 PUBLIC SAFETY SUBSYSTEM - VULNERABILITY ANALYSIS OVERVIEW

UNKNOWN, Unknown Inst. or Indiv. Grant

16.0051 PUBLIC SAFETY SUBSYSTEM - VULNERABILITY TUALIZATION TASK COMPLETION REPORT

UNKNOWN, Natl. Acad. of Sciences

16.0063 WEATHER AND CLIMATE MODIFICATION PROBLEMS AND PROGRESS

UNKNOWN, Natl. Acad. of Sciences

16.0064 FIELD STUDIES OF DISASTER BELIEFS - AN INVENTORY

UNKNOWN, Natl. Acad. of Sciences

16.0065 TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES

UNKNOWN, Natl. Acad. of Sciences

16.0066 WEATHER & CLIMATE MODIFICATION PROBLEMS AND PROGRESS

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

16.0068 FEDERAL PLAN FOR WEATHER RAINFALL

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

16.0069 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - YEAR 1973

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

16.0070 FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - YEAR 1975

UNKNOWN, U.S. Dept. of Commerce, Natl. Oceanic & Atmos. Admin.

16.0071 A FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS

U.S. Dept. of Commerce, Off. of Plans & Pro-  
PLAN TO IMPROVE LOCAL WEATHER  
ASTS

U.S. Dept. of the Interior, Geological Survey  
PROGRAM DESIGN-1971 - SAN FRANCISCO  
REGION ENVIRONMENT AND RESOURCES  
NG STUDY

U.S. Exec. Office of the Pres., Off. of Science &  
egy  
NATIONAL ATMOSPHERIC SCIENCES PRO-  
FISCAL YEAR 1974

U.S. Exec. Office of the Pres., Off. of Emergency  
ness  
REPORT TO THE CONGRESS - DISASTER  
EDNESS

Stephenson Co. Planning Comm.  
A COMPREHENSIVE PLAN FOR STEPHENSON  
Y, ILLINOIS

Clyde E. Williams & Assoc. Inc  
ONING ORDINANCE - KNOX COUNTY, INDI-

State Program Dev. Office  
ONING ORDINANCE AND ORDER, PIKE  
Y, ELKHORN CITY, KENTUCKY

State Program Dev. Office  
ONING ORDINANCE - PAINTSVILLE, KEN-

U.S. Dept. of Commerce, Natl. Oceanic & At-  
min.  
WEATHER MODIFICATION - FISCAL YEARS  
70, 1971

U.S. Dept. of Commerce, National Weather Ser-  
PERATIONS OF THE NATIONAL WEATHER  
E

UNKNOWN, Aurora Planning Board  
16.0095 COMPREHENSIVE PLAN - REPORT C, IMPLE-  
MENTATION - VILLAGE OF EAST AURORA, N.Y.,  
TOWN OF AURORA, N.Y.

UNKNOWN, Unknown Inst. or Indiv. Grant  
16.0096 THE CHARLOTTE CONSORTIUM TASK 1 RE-  
PORT - VOLUME IIA - ANALYSIS OF MUNICIPAL  
ACTIVITIES - PUBLIC SAFETY SUBSYSTEM

UNKNOWN, State Planning & Grants Div.  
16.0102 MYRTLE BEACH, S.C. - COMPREHENSIVE  
DEVELOPMENT PLAN

UNKNOWN, Unknown Inst. or Indiv. Grant  
16.0103 THE WICHITA FALLS CONSORTIUM PHASE I  
REPORT - VOLUME III - ANALYSIS OF MUNICIPAL  
ACTIVITIES - SECTION IV - PUBLIC SAFETY  
SUBSYSTEM

UNKNOWN, U.S. Dept. of Defense, Defense Documentation  
Center

16.0106 SOIL POLLUTION - EROSION EFFECTS IN  
SOIL  
P. VILLONE, U.S. Natl. Aero. & Space Adm., Goddard Space  
Flight Center

16.0009 GLOBAL RESCUE ALARM NETWORK  
(GRAN)

A.W. WIEGANT, Stanford Research Institute  
16.0037 OPTIMUM UTILIZATION OF GOVERNMENT  
AND NON-GOVERNMENT COMMUNICATIONS  
RESOURCES

T.N. WILLIAMSON, Jacobs Associates  
16.0026 DEBRIS CLEARING TIMES AFFECTING CRITI-  
CAL SURVIVAL ACTIONS

R.N. WRIGHT, U.S. Dept. of Commerce, Natl. Bureau of Stan-  
dards  
16.0073 BUILDING PRACTICES FOR DISASTER  
MITIGATION

T.L. YOUNG, U.S. Dept. of the Interior, Geological Survey  
16.0056 SOIL ENGINEERING RESEARCH - CALIFOR-  
NIA

# PROJECT TITLE

A COMPARATIVE ANALYSIS OF PUBLIC SUPPORT OF AND RESISTANCE TO WEATHER MODIFICATION PROJECTS .....	16.0061	A STUDY OF EARTHQUAKE LOSSES IN THE LOS ANGELES, CALIFORNIA AREA .....	3.0
A COMPILATION OF FLOOD ABATEMENT PROJECTS IN OREGON .....	6.0353	A STUDY OF EARTHQUAKE LOSSES IN THE SAN FRANCISCO BAY AREA - DATA AND ANALYSIS .....	3.0
A COMPREHENSIVE PLAN FOR STEPHENSON COUNTY, ILLINOIS .....	6.0260	A STUDY OF FOREST SERVICE TELECOMMUNICATIONS - VOLUME I - SUMMARY - MAIN STUDY RECOMMENDATIONS AND FINDINGS .....	5.0
A COMPREHENSIVE STUDY OF THE SEISMOTECTONICS OF THE ALEUTIAN ARC - ALASKA .....	3.0262	A STUDY OF MICROEARTHQUAKES IN THE SOUTHEASTERN UNITED STATES .....	3.0
A DECISION PROCEDURE FOR APPLICATION IN PREDICTING THE LANDFALL OF HURRICANES .....	8.0130	A STUDY OF NEARSHORE PROCESSES IN SOUTHEAST FLORIDA .....	15.0
A DIGITAL SIMULATION OF MESSAGE TRAFFIC FOR NATURAL DISASTER WARNING COMMUNICATIONS SATELLITE....	16.0047	A STUDY OF SEISMICITY AND CRUSTAL STRUCTURE IN WESTERN WASHINGTON USING A SEISMIC TELEMETRY NETWORK ...	3.0
A FEDERAL PLAN FOR NATURAL DISASTER WARNING AND PREPAREDNESS .....	16.0071	A STUDY OF STRONG EARTHQUAKE GROUND MOTION USING AN ARRAY OF ACCELEROGRAPHS - CALIFORNIA .....	3.0
A GUIDE FOR REDUCING FLOOD DAMAGE IN THE SOUTH ALABAMA REGION .....	6.0158	A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION .....	6.0
A METHODOLOGY STUDY TO DEVELOP EVALUATION CRITERIA FOR WILD AND SCENIC RIVERS - REPORT ON FLOOD CONTROL SUBPROJECT - IDAHO .....	6.0080	A SURVEY OF AVAILABILITY OF HURRICANE/TYPHOON PACKAGES AND ASSOCIATED DATA .....	8.0
A MICROEARTHQUAKE STUDY OF THE LOWER MISSISSIPPI VALLEY - ARKANSAS, MISSISSIPPI AND TENNESSEE .....	3.0236	A SURVEY OF EARTH SLOPE FAILURES AND REMEDIAL MEASURES IN TEXAS .....	9.0
A MODEL OF THE FORESTS OF GLACIER NATIONAL PARK, MONTANA .....	5.0021	A SYNOPTIC CLIMATOLOGY FOR SNOWSTORMS IN NORTHWESTERN NEVADA .....	11.0
A NATIONWIDE PROGRAM TO DEVELOP REGIONAL EMERGENCY MEDICAL COMMUNICATIONS SYSTEMS .....	16.0029	A TECHNIQUE FOR THE ANALYSIS AND FORECASTING OF TROPICAL CYCLONE INTENSITIES FROM SATELLITE PICTURES ...	8.0
A PERSPECTIVE ON DISASTER PLANNING .....	16.0098	A UNIFORM TECHNIQUE FOR DETERMINING FLOOD FLOW FREQUENCIES .....	6.0
A PRELIMINARY VIEW OF STORM SURGES BEFORE AND AFTER STORM MODIFICATIONS .....	8.0059	ACCELERATIONS IN ROCK FOR EARTHQUAKES IN THE WESTERN UNITED STATES .....	3.0
A PROGRAM FOR METROPOLITAN WATER MANAGEMENT .....	6.0243	ACKER LAKE LANDSLIDE, MONROE COUNTY, MISSISSIPPI .....	9.0
A REVIEW OF THE EXPERIMENTAL DATA RELATIVE TO THE PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL .....	13.0027	ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION .....	1.0
A SIMPLIFIED PROCEDURE FOR EVALUATING SOIL LIQUEFACTION POTENTIAL .....	3.0097	ACOUSTIC EMISSION AND RELATED PROPERTIES OF SNOW APPLIED TO THE DETERMINATION OF SLAB AVALANCHE INITIATION 11042-EN .....	1.0
A SIMULATION MODEL FOR EMERGENCY MEDICAL SYSTEMS .....	16.0006	ACTIVE DISPLACEMENT ON THE CALAVERAS FAULT ZONE AT HOLLISTER, CALIFORNIA .....	3.0
A STATISTICAL STUDY OF SOME DESIGN CONCEPTS IN EARTHQUAKE ENGINEERING	3.0252	ACTIVE FAULTS AND GEOLOGIC HAZARDS, PT. MUGU TO WILMINGTON, CALIFORNIA...	13.0
A STATISTICAL SUMMARY OF THE CAUSE AND COST OF BRIDGE FAILURES .....	6.0016		
A STUDY OF CROP-HAIL INSURANCE			

SEISMOLOGICAL BULLETIN, MARCH 1972	3.0223	PHENOMENA
AFTER HAD SEISMICITY - MILROW SEISMIC EFFECTS	3.0220	APPLICATION OF ECONOMIC ANALYSIS OF HURRICANE WARNINGS TO RESIDENTIAL AND RETAIL ACTIVITIES IN THE U.S. GULF OF MEXICO COASTAL REGION
ALLOCATION MODEL FOR FIREFIGHTING RESOURCES	5.0035	APPLICATION OF HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA - VOLUME I
ALTERNATE SOLUTIONS TO WATER RESOURCE DEVELOPMENT-A CASE STUDY - TEXAS	6.0151	REPORT
ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS	6.0359	APPLICATION OF LUNR SYSTEM TO FLOODPLAIN ANALYSIS AND MANAGEMENT OF THE SUSQUEHANNA RIVER BASIN
AN ANALYSIS OF OPERATING SYSTEM EFFECTIVENESS - FOCUS ON THE BEHAVIOR OF LOCAL COORDINATORS	16.0085	APPLICATION OF PROBABILITY, STATISTICS AND DECISION THEORY IN SOIL ENGINEERING
AN APPRAISAL OF FLOODPLAIN REGULATIONS IN THE STATES OF ILLINOIS, INDIANA, IOWA, MISSOURI AND OHIO	6.0266	APPLICATIONS OF AERIAL MEASUREMENT TECHNIQUES
AN ECONOMIC ANALYSIS OF FLOOD DAMAGE REDUCTION ALTERNATIVES IN THE MINNESOTA RIVER BASIN	6.0300	APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA
AN EVALUATION OF HURRICANE AGNES FLOODS IN COMPARISON TO BRIDGE DESIGN INFORMATION AVAILABLE FOR PENNSYLVANIA CONTEMPORANEOUSLY	6.0355	APPRAISAL OF THE WATER AND RELATED LAND RESOURCES OF OKLAHOMA - REGION EIGHT - 1971
AN EVALUATION OF URBAN FLOOD PLAINS	6.0132	AREA-WIDE DISASTER RESPONSE - CIVIL PREPAREDNESS AND REGIONAL COORDINATION
AN INVESTIGATION OF THE SEISMICITY & EARTHQUAKE HAZARDS OF THE SANTA BARBARA CHANNEL REGION - CALIFORNIA	3.0157	ARIZONA 'EDDY' TORNADOES
AN OPTIMUM WATER ALLOCATION MODEL BASED ON AN ANALYSIS FOR THE KISSIMEE RIVER BASIN - FLORIDA	6.0066	ARIZONA EARTH FISSURE INVESTIGATION
ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME I	6.0015	ASSESSMENT OF RESEARCH ON NATURAL HAZARDS
ANALYSIS OF COAL REFUSE DAM FAILURE MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA - VOLUME II, APPENDICES	6.0040	ASSESSMENT OF THE PHYSICAL AND GEOLOGICAL EFFECTS OF TROPICAL STORM AGNES ON THE UPPER CHESAPEAKE BAY AND SELECTED TRIBUTARIES
ANALYSIS OF EMERGENCY MEDICAL SERVICES COLUMBUS AND ALL FRANKLIN COUNTY POLITICAL SUBDIVISIONS	16.0016	ATLANTA METROPOLITAN AREA URBAN FLOOD RUNOFF CHARACTERISTICS - GEORGIA
ANALYSIS OF LAND USE CONTROL MEASURES	6.0194	ATLANTIC HURRICANE FREQUENCIES ALONG THE U.S. COASTLINE
ANALYSIS OF LIQUEFACTION OF SATURATED GRANULAR SOILS DURING EARTHQUAKES	3.0209	ATLANTIC HURRICANE SEASON OF 1971
ANALYSIS OF THE EARTHQUAKE RESPONSE OF A NINE-STORY STEEL FRAME BUILDING DURING THE SAN FERNANDO EARTHQUAKE	3.0148	ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME III - 72 HOUR MOVEMENT
ANALYSIS OF THE SLIDES IN THE SAN FERNANDO DAMS DURING THE EARTHQUAKE OF FEBRUARY 9, 1971	3.0095	ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME I - 24 HOUR MOVEMENT
		ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES - VOLUME II - 48 HOUR MOVEMENT
		ATLANTIC TROPICAL CYCLONE STRIKE PROBABILITIES (FOR SELECTED STATIONS) AND THE MONTH OF SEPTEMBER
		ATLANTIC TROPICAL SYSTEMS OF 1971
		AUTOMATIC MICROEARTHQUAKE PROCESSING - CALIFORNIA

## PROJECT TITLE

AVAILANCHE CONTROL IMPLEMENTATION STUDY .....	1.0014	CHARACTERISTICS OF PEOPLE WHO START FIRES ...SOME PRELIMINARY FINDINGS - CALIFORNIA .....	5.0036
AVAILANCHE STUDIES, 1971-1972 .....	1.0001	CHENA RIVER LAKES PROJECT, ALASKA - PROBLEMS RELATING TO CHANNEL DEVELOPMENT, EROSION, & BANK & LEVEE PROTECTION .....	6.0053
AVAILANCHE ON THE NORTH CASCADES HIGHWAY (SR-20) - SUMMARY REPORT .....	1.0006	CIRCULATION FEATURES OF TROPICAL CYCLONES .....	8.0088
BACKGROUND SURVEY - SURFACE DRAINAGE PROGRAM, MADISON, ST CLAIR, MONROE AND RANDOLPH COUNTIES, ILLINOIS .....	6.0084	CITY OF JACKSON WATER RESOURCES STUDY .....	6.0311
BAL HARBOUR, FLORIDA PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA .....	15.0006	CITY OF JACKSON, MISSISSIPPI, WATER RESOURCES STUDY .....	6.0310
BAROTROPIC PREDICTION OF HURRICANE TRACKS .....	8.0093	CLAY MOBILITY IN RIDGE ROUTE LANDSLIDES, GORMAN, CALIFORNIA .....	9.0017
BEACH CHANGES BY EXTRAORDINARY WAVES CAUSED BY HURRICANE CAMILLE .....	8.0103	CLIMATES OF THE STATES - CLIMATE OF NEW YORK .....	6.0289
BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE .....	15.0010	CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION - PART I .....	16.0082
BEACHES AND GROUND WATER OF CAPE SABLE, FLORIDA, DURING EXTREME DROUGHT .....	2.0014	CLOUD SEEDING POTENTIAL FOR TWELVE RIVER BASINS .....	6.0171
BEECH RIVER WATERSHED PROJECT - TENNESSEE .....	6.0368	COAL MINE DEFORMATION STUDIES, SOMERSET, COLORADO .....	10.0004
BEHAVIOR OF UNDERGROUND BOX CONDUITS IN THE SAN FERNANDO EARTHQUAKE OF 9 FEBRUARY 1971 .....	3.0005	COASTAL ENGINEERING STUDIES RELATED TO FLORIDA'S SHORELINE AND BEACH EROSION PROBLEMS .....	15.0016
BEHAVIOR OF WINDS IN THE LOWEST 1500 FEET IN CENTRAL OKLAHOMA - JUNE 1966 - MAY 1967 .....	12.0038	COASTAL STORM DAMAGE WITH SPECIAL REFERENCE TO THE DELMARVA REGION OF DELAWARE, MARYLAND, VIRGINIA .....	8.0002
BENEFITS OF ENVIRONMENTAL PREDICTION IN THE EASTERN GULF OF MEXICO .....	8.0106	COASTAL WORKS EVALUATION - CALIFORNIA, FLORIDA .....	15.0015
BIG CREEK WATERSHED, KANSAS .....	6.0202	COASTAL ZONE AND SHORELANDS MANAGEMENT - GREAT LAKES .....	15.0026
BIG HILL LAKE, BIG HILL CREEK, KANSAS .....	6.0141	COLLABORATIVE RESEARCH ON NATURAL HAZARDS .....	16.0094
BIRCH LAKE, BIRCH CREEK, OKLAHOMA .....	6.0142	COLLABORATIVE RESEARCH ON SOIL-CEMENT SLOPE PROTECTION FOR EARTH EMBANKMENTS .....	9.0025
BLACK HILLS FLOOD OF JUNE 9, 1972 .....	6.0056	COLLECTION AND ANALYSIS OF STREAM FLOW AND RELATED HYDRAULIC DATA FOR DESIGN OF HIGHWAY BRIDGES AND CULVERTS - IOWA .....	6.0064
BODY RECOVERY DOG .....	16.0008	COMMUNICATIONS IN NATURAL DISASTERS .....	16.0033
BRIDGE SITE INVESTIGATIONS .....	6.0114	COMMUNITY GOALS - MANAGEMENT OPPORTUNITIES - AN APPROACH TO FLOOD PLAIN MANAGEMENT .....	6.0257
BUDGETING JUSTIFICATION FOR EARTHQUAKE ENGINEERING RESEARCH .....	3.0009	COMPARISON OF COMPUTED AND MEASURED DYNAMIC RESPONSE OF MONTICELLO DAM .....	3.0053
BUILDING PRACTICES FOR DIASER MITIGATION .....	3.0188	COMPARISON OF RECENTLY PUBLISHED FORMULAE FOR FLOOD FREQUENCY IN PENNSYLVANIA .....	6.0356
BUILDING PRACTICES FOR DISASTER MITIGATION .....	3.0192	COMPARISONS OF SEISMIC ANALYSES OF TWO IDENTICAL STRUCTURES BASED ON SEISMOGRAMS FROM THE SAN FERNANDO EARTHQUAKE (ABBREV) .....	3.0048
BUILDING PRACTICES FOR DISASTER MITIGATION .....	16.0073	COMPILATION OF BRITTLE STRUCTURES WITHIN NEW YORK STATE .....	3.0256
BUILDING STANDARDS AND THE EARTHQUAKE HAZARD FOR THE PUGET SOUND BASIN .....	3.0281	COMPOSITE MATERIALS FOR OCEAN CONSTRUCTION .....	15.0001
CALIFORNIA M/EO NET .....	3.0134	COMPREHENSIVE PLAN - REPORT C,	
CALTECH SEISMIC NETWORK AND SAN FERNANDO EARTHQUAKE STUDIES .....	3.0139		
CASE STUDIES OF COASTAL CONVECTIVE STORMS AS OBSERVED BY DOPPLER RADAR .....	8.0121		
CASE STUDY OF ECONOMIC ASPECTS OF THE FEDERAL FLOOD INSURANCE PROGRAM .....	6.0007		
CASE STUDY OF REMEDIAL FLOOD MANAGEMENT IN AN URBAN AREA -			

BENEDICT, MARYLAND .....	15.0004	SOLOGRAIC SYSTEM RELATED TO DRAINAGE PROBLEMS OF URBAN AREAS...	6.039
CONSOLIDATED SYSTEMS OF EMERGENCY SERVICES - NEBRASKA (PROJECT 20/20) .....	16.0014	DEFORMATION CHARACTERISTICS OF HILL SLOPES & CHANNELWAYS IN 2 DIFFERENT ENVIRONMENTS AS DEPICTED BY REMOTE SENSOR RETURNS - CALIFORNIA .....	9.0036
CONSTITUTIVE MODELS FOR CYCLIC PLASTIC DEFORMATION OF ENGINEERING MATERIALS .....	3.0081	DELIVERING VOCATIONAL REHABILITATION SERVICES IN A DISASTER AREA .....	6.6014
CONSULTATIVE PSYCHIATRIC SERVICES TO INDIVIDUALS AND COMMUNITY GROUPS AND AGENCIES IN RAPID CITY, SOUTH DAKOTA .....	16.0002	DEMONSTRATION OF A TECHNIQUE FOR LIMITING THE SUBSIDENCE OF LAND OVER ABANDONED MINES ROCK SPRINGS, WYOMING .....	10.0031
CONTINUING QUANTITATIVE GROUND- WATER STUDIES IN THE HOUSTON DISTRICT .....	10.0013	DEMONSTRATION OF THE ELECTRIC ANALOG MODEL OF THE KANSAS RIVER AT THE UNIVERSITY OF CALIFORNIA IN BERKELEY .....	6.0314
CONTRACT FOR PARTIAL SUPPORT OF THE COMMITTEE ON FIRE RESEARCH .....	5.0008	DENSE RAIN GAGE NETWORK PROJECTS - ILLINOIS .....	12.0017
CONTROL AND USE OF FIRE PARTICULARLY IN WILDERNESS, PARK, AND OTHER RECREATIONAL AREAS .....	5.0020	DENVER EARTHQUAKES .....	3.0213
CONTROL OF LAND SUBSIDENCE IN THE TEXAS GULF COAST AREA .....	10.0032	DENVER METROPOLITAN AREA, COLORADO .....	9.0044
COORDINATED ACCIDENT RESCUE ENDEAVOR, STATE OF MISSISSIPPI (PROJECT CARE-SOM) - VOLUME I - OPERATION STRUCTURE AND PROCEDURES .....	16.0013	DENVER METROPOLITAN AREA, COLORADO .....	6.0188
CORNUDAS, NORTH AND CULP DRAWS WATERSHED, HUDSPETH COUNTY, TEXAS, AND OTERO COUNTY, NEW MEXICO .....	6.0201	DENVER URBAN CORRIDOR STUDIES - COLORADO .....	4.0003
CORRELATION OF SATELLITE AND GROUND DATA IN AIR POLLUTION STUDIES (ABBREV) .....	5.0032	DENVER-FRONT RANGE URBAN CORRIDOR...	9.0044
COST-BENEFIT RISK ANALYSIS OF RESEARCH BUDGETING FOR EARTHQUAKE HAZARD MITIGATION .....	3.0008	DEPOSITION OF HAWAIIAN WATERSHED AND ESTUARINE SEDIMENTS .....	15.0018
COST-EFFECTIVENESS ANALYSES OF REGIONAL FLOOD PLAIN MANAGEMENT ACTIVITIES .....	6.0345	DEPTH AND FREQUENCY OF FLOODS IN ILLINOIS .....	6.0251
COSTS OF LAND SUBSIDENCE IN THE HOUSTON-GALVESTON AREA, TEXAS .....	10.0001	DESIGN AND IMPLEMENT A TRANSIT SYSTEM FOLLOWING A NATURAL DISASTER .....	16.0034
CRITICAL ANALYSIS OF FIVE WATERSHED MODELS IN FOUR PHYSIOGRAPHIC REGIONS OF GEORGIA .....	6.0074	DESIGN CRITERIA FOR MASONRY .....	3.0194
CRUSTAL DEFORMATION RELEASE, FAILURE AND TILTS IN ALASKA .....	3.0070	DESIGN FOR FLOOD CONTROL AND WAVE PROTECTION, CHAGRIN RIVER, EASTLAKE, OHIO - HYDRAULIC MODEL INVESTIGATION .....	6.0114
CRUSTAL STRAIN - CALIFORNIA, NEVADA, MONTANA, UTAH AND NEW MEXICO .....	3.0127	DESIGN OF HAIL SUPPRESSION EXPERIMENT IN ILLINOIS .....	7.0011
CYCLIC BEHAVIOR OF THREE REINFORCED CONCRETE (R.C.) FLEXURAL MEMBERS WITH HIGH SHEAR .....	3.0088	DESIGN OF OPTIMAL PRECIPITATION NETWORKS .....	6.0104
CYCLIC LOADING OF FULL-SIZE CONNECTIONS .....	3.0089	DESIGN TO ESTABLISH A FEASIBLE PLAN FOR EMERGENCY MEDICAL CARE, IN THE METROPOLITAN NASHVILLE-MIDDLE TENNESSEE REGION .....	16.0024
DAILY TORNADO FREQUENCIES FOR THE CONTIGUOUS UNITED STATES .....	12.0037	DESIGN, SITING, AND CONSTRUCTION OF LOW-COST HOUSING AND COMMUNITY BUILDINGS TO BETTER WITHSTAND EARTHQUAKES AND WINDSTORMS .....	3.0194
		DETECTION OF SUBSURFACE OPENINGS - INDIANA, MISSOURI .....	10.0004
		DETERMINATION OF COST-EFFECTIVE TECHNICAL PROCEDURES FOR USE IN THE OHIO FLOOD PLAIN MANAGEMENT PROGRAM .....	6.0344

CONNECTION RIVER BASIN	6.0292	DISASTER RELIEF - DOMESTIC ACTION IN THE SPOTLIGHT	16
DETERMINATION OF FLOOD PEAKS, FLOOD PROFILES, & FLOOD INUNDATION - NEW JERSEY	6.0326	DISASTER WARNING SATELLITE STUDY	16
DETERMINATION OF SNOW FENCE DESIGN CRITERIA, AND DEVELOPMENT OF A HANDBOOK FOR SNOW CONTROL	11.0008	DISCHARGE CHARACTERISTICS OF HURRICANE BARRIERS, WAREHAM-MARION, MASSACHUSETTS - HYDRAULIC MODEL INVESTIGATION	8
DEVELOP DESIGN CRITERIA FOR MINING SALT-DOME DEPOSITS TO MINIMIZE SURFACE SUBSIDENCE	10.0022	DISCHARGE CHARACTERISTICS OF HURRICANE BARRIER, EAST PASSAGE OF NARRAGANSETT BAY, RHODE ISLAND - HYDRAULIC MODEL INVESTIGATION	6
DEVELOP METHODS FOR PREDICTING THE COMPONENTS OF GROUND MOVEMENT ABOVE MINE WORKINGS	10.0005	DOPPLER RADAR METHODOLOGY FOR THE OBSERVATION OF CONVECTIVE STORMS	12
DEVELOPING REMOTE SENSING TECHNIQUES FOR AIDING PREDICTION OF LANDSLIDES	9.0058	DOWNTOWN URBAN RENEWAL PROJECT, WILKES-BARRE, PENNSYLVANIA	6
DEVELOPMENT IN FLOOD-PRONE AREAS OF LINCOLN COUNTY, OREGON AUGUST, 1973	6.0354	DRAINAGE AND FLOOD CONTROL, BACKGROUND AND POLICY STUDY - SAN DIEGO	6
DEVELOPMENT OF A DISTRESS ALERTING AND LOCATING SYSTEM (DALS) FOR SEARCH AND RESCUE MISSION	16.0015	DRAINAGE AND FLOOD CONTROL, BACKGROUND AND POLICY STUDY - SUMMARY REPORT	6
DEVELOPMENT OF A FLOOD AND POLLUTION CONTROL PLAN FOR THE CHICAGO/LAND AREA - COMPUTER SIMULATION PROGRAMS	6.0083	DRAINAGE AND FLOOD CONTROL PLAN - MARION COUNTY, INDIANA SEPTEMBER 1970	6
DEVELOPMENT OF AERIAL MEASUREMENT TECHNIQUES	6.0165	DRAINAGE STUDY - INVENTORY AND ANALYSIS	6
DEVELOPMENT OF AN ALASKAN CONCEPTUAL WATERSHED MODEL	6.0163	DROUGHT AND WET SPELLS IN NORTH DAKOTA	2
DEVELOPMENT OF AN OPERATIONS MODEL FOR MONTANA'S WATER RESOURCES, MIDDLE CREEK RESERVOIR OPERATION	6.0126	DROUGHT CLIMATOLOGY OF ILLINOIS	2
DEVELOPMENT OF CRITERIA FOR RECOGNIZING & IDENTIFYING SLOPE FAILURE FORMS AS DEPICTED BY REMOTE SENSOR RETURNS - NORTH CAROLINA	9.0063	DROUGHT IN KANSAS	2
DEVELOPMENT OF EMISSION FACTORS FOR ESTIMATING ATMOSPHERIC EMISSIONS	5.0044	DROUTH PROBABILITIES IN TENNESSEE	2
DEVELOPMENT OF HYDROLOGIC DATA NETWORKS IN URBAN AREAS	6.0220	DUST DEVIL METEOROLOGY	12
DEVELOPMENT OF IMPROVED EMERGENCY OPERATIONS SIMULATION TRAINING (EOST) TRAINING PROCEDURES	16.0060	DYNAMIC ANALYSIS OF COUPLED SHEAR WALLS AND SANDWICH BEAMS	3
DEVELOPMENT OF IMPROVED TECHNIQUES FOR USING PRESCRIBED FIRE IN SOUTHERN FORESTS	5.0042	DYNAMIC BEHAVIOR OF A HIGH-RISE DIAGONALLY BRACED STEEL BUILDING	3
DEVELOPMENT OF MAGNITUDE AND FREQUENCY RELATIONSHIPS OF FLOODS ON SMALL STREAMS OF MISSOURI	6.0316	DYNAMIC BEHAVIOR OF BILINEAR STRUCTURAL SYSTEMS	3
DEVELOPMENT OF METHODOLOGY FOR EVALUATION AND PREDICTION OF AVALANCHE HAZARD IN THE SAN JUAN MOUNTAINS OF COLORADO	1.0008	DYNAMIC STABILITY OF EARTH STRUCTURES	3
DEVELOPMENT OF NEW AND IMPROVED FIRE CONTROL METHODS FOR SOUTHERN FORESTS	5.0011	DYNAMICS OF BUILDING - SOIL INTERACTION	3
DEVELOPMENT OF RAINFALL DEFICIENCY INDEX FOR PUERTO RICO	2.0022	DYNOR - DYNAMIC ANALYSIS OF STRUCTURAL SYSTEMS	3
DEVELOPMENT OF TRAINING PROGRAM FOR EMERGENCY MEDICAL SERVICE PROGRAM ADMINISTRATION	16.0003	EARLY DETECTION AND CORRECTION OF SINKHOLE PROBLEMS - ALABAMA	10
DEVELOPMENT OF WATER RESOURCE MANAGEMENT METHODS - TENNESSEE	6.0367	EARTH AND ROCKFILL DAM DESIGN PRACTICES	3
		EARTH STRUCTURE AND FAULT TECTONICS AS RELATED TO EARTHQUAKE PREDICTION - CALIFORNIA	3
		EARTHQUAKE - INDUCED EMBANKMENT DISTRESS	3
		EARTHQUAKE ANALYSIS OF MULTISTORY BUILDINGS INCLUDING FOUNDATION INTERACTION	3
		EARTHQUAKE ANALYSIS OF STRUCTURE-FOUNDATION SYSTEMS	3
		EARTHQUAKE CONTROL EXPERIMENT - MINNESOTA	3
		EARTHQUAKE DESIGN FOR MASONRY STRUCTURES	3

EARTHQUAKE DISTRIBUTION AND MECHANISM OF FAULTING IN THE RAINBOW MOUNTAIN-DIXIE VALLEY-FAIRVIEW PEAK AREA, CENTRAL NEVADA	3.0250	ECONOMIC FACTORS AFFECTING CHANGE IN THE INTENSITY OF FLOOD PLAIN USE	6.0272
EARTHQUAKE EFFECTS ON REINFORCED CONCRETE BUILDINGS	3.0211	EFFECT OF AGNES FLOODS ON ANNUAL SERIES IN PENNSYLVANIA	6.0361
EARTHQUAKE EFFECTS ON STRUCTURES	3.0203	EFFECT OF PRESCRIBED BURNING ON WATER YIELD AND QUALITY FROM BRUSH INFESTED LANDS - TEXAS	5.1022
EARTHQUAKE HAZARD REDUCTION, SAN FRANCISCO BAY REGION	9.0028	EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA	6.0282
EARTHQUAKE HAZARDS REDUCTION-- NORTHWEST AND GEOLOGY OF THE NORTHWESTERN OLYMPIC PENINSULA, WASHINGTON	3.0128	EFFECT OF URBANIZATION ON FLOOD RUNOFF - WICHITA AREA, KANSAS	6.0281
EARTHQUAKE INDUCED TRANSIENT PORE PRESSURES IN EARTH DAMS	3.0231	EFFECTS OF DEFORESTATION ON THE STABILITY OF NATURAL SLOPES - OREGON, WASHINGTON	9.0051
EARTHQUAKE MODELING	3.0114	EFFECTS OF EARTHQUAKES ON SOIL PERFORMANCE	3.0153
EARTHQUAKE RESISTANCE OF EARTH AND ROCKFILL DAMS	3.0066	EFFECTS OF FOREST CLEAR-CUTTING ON THE STABILITY OF NATURAL SLOPES	9.0052
EARTHQUAKE RESISTANT DESIGN REQUIREMENTS FOR VA HOSPITAL FACILITIES	3.0201	EFFECTS OF HURRICANE CAMILLE ON THE LANDSCAPE OF THE BRETON-CHANDELEUR ISLAND CHAIN AND THE EASTERN PORTION OF THE LOWER MISSISSIPPI DELTA	8.0005
EARTHQUAKE RESPONSE OF AXISYMMETRIC TOWER STRUCTURES SURROUNDED BY WATER	3.0034	EFFECTS OF SOIL CONDITIONS ON GROUND MOTIONS DURING EARTHQUAKES - ALASKA AND CALIFORNIA	3.0691
EARTHQUAKE RESPONSE OF BUILDING-FOUNDATION SYSTEMS	3.0041	EFFECTS OF TROPICAL STORM AGNES ON THE CHESAPEAKE BAY	8.0002
EARTHQUAKE RESPONSE OF CONCRETE GRAVITY DAMS	3.0031	EFFECTS OF TWO-DIMENSIONAL EARTHQUAKE MOTION ON A REINFORCED CONCRETE COLUMN	3.0236
EARTHQUAKE RESPONSE OF GRAVITY DAMS INCLUDING RESERVOIR INTERACTION	3.0029	EFFECTS OF URBAN DEVELOPMENT AND WATER USE ON THE SANTA ANA RIVER, CALIFORNIA	6.0039
EARTHQUAKE RISK EVALUATION - CRITTENDEN COUNTY, ARKANSAS, DESOTO COUNTY, MISSISSIPPI, AND SHELBY COUNTY, TENNESSEE	3.0269	EFFECTS OF URBANIZATION ON FLOODS AT DURHAM, NORTH CAROLINA	6.0135
EARTHQUAKE SAFETY OF SCHOOL BUILDINGS	3.0075	EFFECTS OF URBANIZATION ON FLOODS AT LENOIR, NORTH CAROLINA	6.0136
EARTHQUAKE STABILITY OF REINFORCED EARTH STRUCTURES	3.0037	EFFECTS OF URBANIZATION ON FLOODS AT MORGANTON, NORTH CAROLINA	6.0343
EARTHQUAKES AND ACTIVE FAULTS	3.0173	EFFECTS OF URBANIZATION ON FLOODS AT WINSTON-SALEM, NORTH CAROLINA	6.0134
EARTHQUAKES AND INSURANCE	3.0001	EFFECTS OF URBANIZATION ON FLOODS IN CHARLOTTE, NORTH CAROLINA	6.0342
EARTHQUAKES AND INSURANCE - ERA CONFERENCE 2-3 APRIL 1973	3.0140	EFFECTS OF URBANIZATION ON FLOODS IN THE DALLAS, TEXAS METROPOLITAN AREA	6.0374
EARTHQUAKES INDUCED BY UNDERGROUND FLUID INJECTION	3.0272	EFFECTS OF URBANIZATION ON FLOODS IN THE HOUSTON, TEXAS METROPOLITAN AREA	6.0376
EARTHQUAKES RECORDED BY A SEISMOGRAPH NETWORK LOCATED IN THE SOUTHERN NEVADA REGION, JANUARY 1-DECEMBER 22, 1971	3.0246	EFFECTS ON LAKE PONTCHARTRAIN, L.A., OF HURRICANE SURGE CONTROL STRUCTURES AND MISSISSIPPI RIVER-GULF OUTLET CHANNEL	8.0048
EARTHQUAKES RELATED TO RESERVOIR FILLING	3.0054	ELASTIC-PLASTIC EARTHQUAKE RESPONSE OF SOIL-BUILDING SYSTEMS	3.0085
EARTHWORK REINFORCEMENT TECHNIQUES - LOS ANGELES AREA	9.0005	ELASTOMERIC ENERGY ABSORBER	3.0152
EASTERN SNAKE RIVER PLAIN REGION INVESTIGATIONS - IDAHO	14.0011	ELEMENTS OF DYNAMIC-INELASTIC DESIGN CODE	3.0154
ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL	7.0007		
ECONOMIC AND INSTITUTIONAL CONSIDERATIONS OF SUPPRESSING HAIL	7.0005		
ECONOMIC AND LEGAL ANALYSIS OF ALTERNATIVE FLOOD CONTROL STRATEGIES	6.0291		



SYMPOSIUM, HELD AT ARGONNE NATIONAL LABORATORY (ABBREV).....	5.0009	EVALUATION OF EMERGENCY CALL SYSTEMS.....	16.0031
ENERGY ABSORPTION CHARACTERISTICS OF STRUCTURAL SYSTEMS SUBJECTED TO EARTHQUAKE EXCITATION.....	3.0032	EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA..	3.0071
ENERGY, MASS AND ANGULAR MOMENTUM BUDGETS OF EXTRATROPICAL CYCLONES..	8.0137	EVALUATION OF FLOOD INSURANCE IN A DISASTER AREA.....	6.0013
ENG AFTERSHOCK STUDIES - CALIFORNIA.....	3.0159	EVALUATION OF FLOOD PEAK PREDICTION METHODS IN SEMI-ARID REGIONS IN RELATION TO DAM SAFETY.....	6.0322
ENGINEERING ASPECTS OF THE 1971 SAN FERNANDO EARTHQUAKE.....	3.0055	EVALUATION OF FLOOD RISKS.....	6.0264
ENGINEERING GEOLOGIC REPORT OF GENERAL PLAN STUDY FOR THE CITY OF GLEN DORA, CALIFORNIA.....	9.0026	EVALUATION OF GEOLOGIC AND OCEANOGRAPHIC FACTORS INFLUENCING EROSION OF THE OREGON COAST.....	15.0033
ENGINEERING GEOLOGY - ILLINOIS.....	9.0011	EVALUATION OF LONG PERIOD SURFACE WAVES IN THE GULF OF ALASKA.....	13.0012
ENGINEERING GEOLOGY RECONNAISSANCE STUDIES OF COASTAL COMMUNITIES, ALASKA.....	13.0017	EVALUATION OF POLICY-RELATED RESEARCH IN THE FIELD OF MUNICIPAL SYSTEMS, OPERATIONS, AND SERVICES - EMERGENCY MEDICAL SERVICES.....	16.0022
ENGINEERING SEISMOLOGY.....	3.0019	EVALUATION OF STRUCTURAL DAMAGE CAUSED BY EARTHQUAKE TOWARD THE DEVELOPMENT OF EARTHQUAKE- RESISTANT DESIGN (ABBREV).....	3.0212
ENGINEERING SEISMOLOGY - CALIFORNIA.....	3.0118	EVALUATION OF THE INCREMENTAL SEISMIC RISK DUE TO RESERVOIR FILLING..	3.0142
ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COASTAL ZONE, GALVESTON- HOUSTON AREA.....	16.0104	EVALUATION OF THE ION EXCHANGE LANDSLIDE CORRECTION TECHNIQUE.....	9.0039
ENVIRONMENTAL GEOLOGY OF SELECTED PARTS OF NORTHWESTERN VERMONT.....	15.0038	EXPEDIENT AM AND FM BROADCAST ANTENNAS.....	16.0107
ENVIRONMENTAL GEOLOGY OF THE SAN FRANCISCO BAY REGION - CALIFORNIA.....	3.0109	EXPERIMENTAL AND THEORETICAL STUDY OF THE DILATANCY-DIFFUSION MODEL FOR EARTHQUAKE PREDICTION.....	3.0260
ENVIRONMENTAL GEOMORPHIC STUDY OF THE COASTAL REGIMES ALONG THE SOUTH SHORE OF LONG ISLAND - NEW YORK.....	15.0027	EXPERIMENTAL INVESTIGATION INTO THE SEISMIC BEHAVIOR OF CRITICAL REGIONS OF REINFORCED CONCRETE COMPONENTS AS INFLUENCED BY MOMENT AND SHEAR..	3.0076
ENVIRONMENTAL INFLUENCES ON STABILITY OF SOIL MASSES - ALASKA AND OHIO.....	9.0060	EXTENDED AREA EFFECTS FROM LOCAL WEATHER MODIFICATION.....	7.0013
ENVIRONMENTAL PLANNING AND GEOLOGY - PROCEEDINGS OF THE SYMPOSIUM ON ENGINEERING GEOLOGY IN THE URBAN ENVIRONMENT.....	16.0054	EXTENDING THE COMPUTERIZED TYPHOON/TROPICAL STORM PREDICTION PROGRAM (TYPHOON 72) TOWARD SEVEN DAYS.....	8.0105
EROSION AND DEPOSITION IN THE SOUNDS AND ESTUARIES OF THE NORTH CAROLINA COAST.....	15.0029	FACTORS AFFECTING RELOCATION IN RESPONSE TO RESERVOIR DEVELOPMENT..	6.0004
EROSION AND SEDIMENTATION FOLLOWING ROAD CONSTRUCTION AND TIMBER HARVEST ON UNSTABLE SOILS IN THREE SMALL WESTERN OREGON WATERSHEDS...	15.0034	FACTORS PERTINENT TO WATER QUALITY IN THE ALBUQUERQUE METROPOLITAN AREA.....	6.0128
ERROR ANALYSIS OF HURRICANE FORECASTS.....	8.0092	FAULT ZONE TECTONICS (CREEP) - CALIFORNIA.....	3.0110
ESSA AND OPERATION FORESIGHT.....	6.0057	FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1974.....	12.0005
ESTABLISH TECHNIQUES FOR MONITORING SURFACE SUBSIDENCE OVER MINED AREAS.....	10.0023	FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1973.....	16.0069
ESTIMATE OF MAXIMUM WIND SPEEDS OF TORNADOES IN THREE NORTHWESTERN STATES - IDAHO, OREGON, WASHINGTON...	12.0030	FEDERAL PLAN FOR METEOROLOGICAL SERVICES & SUPPORTING RESEARCH - FISCAL YEAR 1975.....	16.0070
ESTIMATING CROP LOSSES DUE TO HAIL. STATISTICAL SUPPLEMENT TO AGRICULTURAL ECONOMIC REPORT NO. 267.....	7.0001	FEDERAL PLAN FOR WEATHER RADARS.....	16.0068
ESTUARINE HYDROLOGY OF TAMPA BAY.....	6.0071	FEDERAL PLAN FOR WEATHER RADARS.....	16.0046
EVACUATION OF COASTAL RESIDENTS DURING HURRICANES A PILOT STUDY FOR DADE COUNTY, FLORIDA.....	8.0026		

FHA STUDY OF SEISMIC DESIGN CRITERIA FOR HIGHRISE BUILDINGS .....	3.0158	FLOOD FREQUENCY OF SMALL STREAMS IN LOUISIANA .....
FIELD STUDIES OF DISASTER BEHAVIOR - AN INVENTORY .....	16.0064	FLOOD FREQUENCY STUDY ILLINOIS .....
FINAL REPORT OF THE DISASTER SURVEY TEAM ON THE EVENTS OF AGNES .....	8.0022	FLOOD FREQUENCY STUDY IN NEW MEXICO .....
FIRE CONTROL PLANNING AND FIRE PREVENTION IN THE NORTHEASTERN UNITED STATES .....	5.0014	FLOOD FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA .....
FIRE ENVIRONMENTAL TEST CHAMBER - ITS DESIGN AND DEVELOPMENT .....	5.0033	FLOOD FREQUENCY, LOG-PEARSON TYPE III ANALYSIS - IOWA .....
FIRE MANAGEMENT SYSTEMS .....	5.0007	FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES .....
FIRE ON A FOREST SOIL .....	5.0047	FLOOD HAZARD EVALUATION GUIDELINES FOR FEDERAL EXECUTIVE AGENCIES .....
FIRE PREVENTION - CALIFORNIA .....	5.0025	FLOOD HAZARD INFORMATION - BUFFALO CREEK, LOGAN COUNTY, WEST VIRGINIA POST-DISASTER CONDITIONS .....
FIRE SURVEILLANCE SYSTEMS FOR THE DETECTION AND MAPPING OF FIRES .....	5.0046	FLOOD HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII .....
FIRE WEATHER & BEHAVIOR OF THE LITTLE SIOUX FIRE - MINNESOTA .....	5.0016	FLOOD HYDROLOGY INVESTIGATIONS .....
FIRE WEATHER AND FIRE BEHAVIOR AT THE 1968 CANYON FIRE - CALIFORNIA .....	5.0004	FLOOD HYDROLOGY OF SMALL DRAINAGE AREAS .....
FIRE WHIRLWIND FORMATION OVER FLAT TERRAIN .....	5.0045	FLOOD HYDROLOGY ON SMALL DRAINAGE AREAS IN GEORGIA .....
FIRES CAUSED BY EQUIPMENT USED DURING CRITICAL FIRE WEATHER IN CALIFORNIA, 1962 - 1971 .....	5.0034	FLOOD INSURANCE STUDY .....
FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION .....	6.0391	FLOOD INSURANCE STUDY .....
FLOOD AND SEDIMENT REDUCTION IN STEEP UNSTABLE BRUSHLANDS OF THE SOUTHWEST .....	6.0041	FLOOD INUNDATION MAPPING, NORTHEASTERN ILLINOIS .....
FLOOD CHARACTERISTICS OF SMALL DRAINAGE AREAS, IDAHO .....	6.0063	FLOOD INUNDATION STUDY - WISCONSIN .....
FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN RHODE ISLAND .....	6.0297	FLOOD INUNDATION STUDY, WISCONSIN COMMISSION - KANSAS .....
FLOOD CHARACTERISTICS OF SMALL DRAINAGE BASINS IN VERMONT .....	6.0296	FLOOD INVESTIGATIONS - NEW YORK .....
FLOOD CONTROL IN THE LOWER MISSISSIPPI RIVER VALLEY .....	6.0121	FLOOD INVESTIGATIONS - TENNESSEE .....
FLOOD CONTROL STUDY OF RIO GRANDE DE MANATI, MANATI AND BARCELONETA, PUERTO RICO .....	6.0362	FLOOD INVESTIGATIONS FOR SMALL AREAS - IDAHO .....
FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA .....	6.0399	FLOOD INVESTIGATIONS IN WYOMING .....
FLOOD DAMAGE ABATEMENT- FEDERAL ASSISTANCE TO LOCAL GOVERNMENT .....	6.0398	FLOOD MANAGEMENT STUDY .....
FLOOD FLOW CHARACTERISTICS OF SMALL BASINS IN MASSACHUSETTS .....	6.0106	FLOOD MANAGEMENT STUDY - TUSCALOOSA, PICKENS COUNTY AND MOUNDSVILLE, ALABAMA, MAY 1971 .....
FLOOD FLOWS FROM SMALL DRAINAGE AREAS .....	6.0058	FLOOD OF JULY 17, 1972 IN GALLUP, NEW MEXICO .....
FLOOD FLOWS FROM SMALL DRAINAGE BASINS IN ILLINOIS .....	6.0082	FLOOD PLAIN ANALYSIS AND DISASTER STUDY, CLATSOP AND TILLAMOOK COUNTIES, OREGON - 1972-1973 .....
FLOOD FORECASTING IN THE UPPER MIDWEST - DATA ASSEMBLY AND PRELIMINARY ANALYSIS .....	6.0301	FLOOD PLAIN AND PEAK FLOW STUDIES, NEW JERSEY .....
FLOOD FREQUENCY AND HIGH-FLOW STUDIES .....	6.0023	FLOOD PLAIN INUNDATION .....
FLOOD FREQUENCY IN SMALL DRAINAGE AREAS - MISSISSIPPI .....	6.0065	FLOOD PLAIN MANAGEMENT STUDIES - LOWER MINNESOTA RIVER .....
FLOOD FREQUENCY IN URBAN AREAS - COLORADO .....	6.0187	FLOOD PLAIN MAPPING IN HAWAII .....
		FLOOD PLAIN STUDIES--MINNESOTA .....
		FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE, MARCH, 1972 .....
		FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE .....
		FLOOD PLAN FOR BULLITT COUNTY, KENTUCKY .....
		FLOOD PREVENTION MEASURES FOR

## PROJECT TITLE

FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, LINN COUNTY, IOWA .....	6.0280	FORECASTING GUSTY SURFACE WINDS IN THE CONTINENTAL UNITED STATES .....	12.0029
FLOOD PROFILES AND FLOOD-PLAIN INFORMATION, CEDAR RAPIDS, IOWA .....	6.0279	FORECASTING RAINFALL AND SNOWMELT FLOODS ON UPPER MIDWESTERN WATERSHEDS .....	6.0113
FLOOD PROFILES AND FLOOD-PLAIN INFORMATION FOR UNIVERSITY BRANCH, DRY RUN CREEK, CEDAR FALLS, IOWA .....	6.0277	FORECASTING STORM-INDUCED BEACH CHANGES ALONG VIRGINIA'S OCEAN COAST .....	8.0134
FLOOD PROFILES AND INUNDATED AREAS ALONG THE SKOKOMISH RIVER, WASHINGTON .....	6.0404	FOREST FIRE BEHAVIOR - CALIFORNIA .....	5.0006
FLOOD PROFILES AND INUNDATED AREAS ALONG THE LOWER NISQUALLY RIVER, WASHINGTON .....	6.0403	FOREST FIRE HISTORY - A COMPUTER METHOD OF DATA ANALYSIS .....	5.0038
FLOOD PROFILES OF IOWA STREAMS .....	6.0274	FOREST FIRE METEOROLOGY IN THE PACIFIC COASTAL REGION .....	5.0040
FLOOD PROOFING DECISIONS UNDER UNCERTAINTY - AN APPLICATION TO THE CONNECTICUT RIVER BASIN .....	6.0105	FOREST FIRE STATISTICAL PROBLEMS .....	5.0041
FLOOD PROTECTION AT CULVERT OUTLETS .....	6.0050	FOREST FIRES IN MISSOURI .....	5.0015
FLOOD SERIES FOR GAGED PENNSYLVANIA STREAMS .....	6.0146	FORT SCOTT LAKE, MARMATON RIVER, KANSAS .....	6.0315
FLOOD WAVES FROM A CONTROLLED BREACHED DAM .....	6.0124	FREQUENCIES OF CREST HEIGHTS FOR RANDOM COMBINATIONS OF ASTRONOMICAL TIDES AND TSUNAMIS RECORDED AT CRESCENT CITY, CALIFORNIA .....	13.0001
FLOOD-CONTROL PROJECT HOOSIC RIVER, NORTH ADAMS MASSACHUSETTS .....	6.0120	FREQUENCY AND INTENSITY OF FREEZING RAIN/DRIZZLE IN OHIO .....	11.0009
FLOOD-FREQUENCY AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS .....	6.0215	FULL SCALE TEST ON A TWO-STORY HOUSE SUBJECTED TO LATERAL LOAD .....	3.0195
FLOOD-FREQUENCY RELATIONSHIPS FOR SMALL DRAINAGE AREAS - VIRGINIA .....	6.0180	FURTHER VERIFICATIONS OF AND EXPERIMENTS TO IMPROVE THE MODIFIED HATRACK SCHEME FOR FORECASTING THE MOTION OF TROPICAL CYCLONES .....	8.0052
FLOOD-FREQUENCY STUDY - KENTUCKY .....	6.0093	GALVESTON BAY HURRICANE SURGE - REPORT (2) EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) .....	8.0046
FLOOD-FREQUENCY SYNTHESIS FOR SMALL STREAMS - ALABAMA .....	6.0034	GALVESTON BAY HURRICANE SURGE - REPORT 1 - EFFECTS OF PROPOSED BARRIERS ON HURRICANE SURGE HEIGHTS (ABBREV) .....	8.0045
FLOOD-PROOFING REGULATIONS .....	6.0358	GALVESTON BAY HURRICANE SURGE - REPORT 2. EFFECTS OF PROPOSED BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) .....	8.0038
FLOODING OF SMALL STREAMS IN NASHVILLE-DAVIDSON COUNTY AREA, TENNESSEE .....	6.0370	GALVESTON BAY HURRICANE SURGE - REPORT 3 - EFFECTS OF BARRIERS ON TIDES, CURRENTS, SALINITIES, AND DYE DISPERSION (ABBREV) .....	8.0039
FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA .....	6.0321	GALVESTON BAY HURRICANE SURGE STUDY - BARRIERS ON HURRICANE SURGE HEIGHTS - HYDRAULIC MODEL INVESTIGATION .....	8.0040
FLOODS FROM SMALL DRAINAGE AREAS - CALIFORNIA .....	6.0176	GENERAL PLAN REPORT, LAKE RED BLUFF AREA, CALIFORNIA, 1971 .....	6.0179
FLOODS FROM SMALL DRAINAGE AREAS - MARYLAND .....	6.0102	GENERAL PURPOSE COMPUTER PROGRAM FOR INELASTIC DYNAMIC RESPONSE OF PLANE STRUCTURES .....	3.0079
FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA .....	6.0043	GENERAL REVIEW OF THE SEISMIC HAZARD TO SELECTED U.S. NAVY INSTALLATIONS ..	13.0002
FLOODWAY EVALUATIONS BEFORE & AFTER CHANNEL MODIFICATIONS ASSUMING TOTAL METROPOLITAN DEVELOPMENT IN DRAINAGE BASINS JEFFERSON COUNTY, ALABAMA .....	6.0161	GEODIMETER STUDIES OF CASCADE VOLCANOES - WASHINGTON, OREGON AND CALIFORNIA .....	14.0000
FLORIDA CUMULUS SEEDING EXPERIMENT FOR DROUGHT MITIGATION, APRIL-MAY 1971 .....	2.0010		
FLOW REGULATION EFFECTS OF THE BURLINGTON RESERVOIR FROM THE DAM DOWNSTREAM TO WESTHOPE, NORTH DAKOTA .....	6.0062		
FLOW SLIDE CONTROL WITH SLOPE REVETMENTS .....	9.0020		
FORCED VIBRATION OF A 22-STORY STEEL			

GRANT WAVES HIT HAWAII.....	8.0097	HYDRAULICS OF SHALLOW FLOWS OVER STABLE ERODED SAND SURFACES DEFINED BY AREA SPECTRA.....	6.0269
GLEN CANYON AND AUBURN DAM SEISMICITY - COLORADO.....	3.0166	HYDROGRAPH MODEL STUDIES OF THE HILLSBOROUGH, ALAFIA, AND ANCIOTE RIVER BASINS, FLORIDA.....	6.0234
GLENDORA, CALIFORNIA, GENERAL PLAN 1990.....	6.0170	HYDROLOGIC AND BIOLOGIC STUDIES OF SOUTHWEST FLORIDA (BIG CYPRESS).....	6.0067
GLOBAL RESCUE ALARM NETWORK (GRAN). 16.0009		HYDROLOGIC BASE FOR WATER MANAGEMENT, DADE COUNTY, FLORIDA...	6.0069
GRAND ISLE, LOUISIANA, AND VICINITY HURRICANE PROTECTION ASSOCIATED WATER FEATURE, BAYOU LAFOURCHE - LOUISIANA (ABBREV).....	8.0030	HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE.....	6.0103
GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES I, II, & III (ABBREV).....	8.0011	HYDROLOGIC EFFECTS OF A SMALL RESERVOIR ON THE WATER SYSTEM OF NEDERLO CREEK, WISCONSIN.....	6.0408
GRANT TO DESIGN A REBUILDING PLAN FOR GULFPORT, MISSISSIPPI, TO RESTORE THE DAMAGE OF HURRICANE CAMILLE, VOLUMES IV & V (ABBREV).....	8.0012	HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES.....	6.0338
GRAPHICAL DISPLAY OF HURRICANE FORECASTS.....	8.0090	HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT - VOLUME I - REQUIREMENTS AND GENERAL PROCEDURES.....	6.0037
GREATER ANCHORAGE AREA BOROUGH, ALASKA.....	3.0172	HYDROLOGIC EQUIPMENT - FLASH FLOOD ALARM SYSTEM.....	6.0104
GROIN STUDY ON THE NORTH SHORE OF SUFFOLK COUNTY, LONG ISLAND, NEW YORK, BETWEEN ORIENT POINT AND PORT JEFFERSON HARBOR.....	15.0028	HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS.....	6.0149
GUIDES FOR FUEL-BREAKS IN THE SIERRA NEVADA MIXED-CONIFER TYPE.....	5.0005	HYDROLOGIC MODELS OF THE GREAT LAKES.....	6.0267
HAIL AND LIGHTNING - COLORADO.....	7.0012	HYDROLOGIC RELATIONS IN HAWAII.....	6.0247
HAMILTON 2 DEGREE.....	3.0184	HYDROLOGIC STUDIES (STORM STUDIES).....	6.0095
HAWAII ENVIRONMENTAL SIMULATION MODEL.....	6.0252	HYDROLOGIC STUDIES OF SMALL RURAL TEXAS WATERSHEDS.....	6.0375
HAWAIIAN VOLCANO OBSERVATORY.....	14.0004	HYDROLOGIC STUDY OF SMALL RURAL WATERSHEDS - INDIANA.....	6.0208
HELICOPTER AMBULANCE SERVICE TO EMERGENCIES.....	16.0012	HYDROLOGIC SYSTEMS MODELING AND SIMULATION.....	2.0007
HOLLOW CREEK WATERSHED PROJECT, SOUTH CAROLINA.....	6.0197	HYDROLOGY OF OUTSTANDING FLOODS.....	6.0211
HURRICANE CAMILLE - AUGUST 1969.....	8.0074	HYDROLOGY OF SMALL WATERSHEDS.....	6.0190
HURRICANE CELIA REDEVELOPMENT.....	8.0015	HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY - MISSOURI.....	6.0319
HURRICANE CREEK WATERSHED PROJECT, HUMPHREYS AND DICKSON COUNTIES, TENNESSEE.....	6.0055	HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA.....	6.0317
HURRICANE CREEK WATERSHED STRUCTURAL PROJECT MEASURE, KENTUCKY.....	6.0200	HYDROLOGY OF SUBURBAN AREAS - NEW JERSEY.....	6.0323
HURRICANE DEBBIE MODIFICATION EXPERIMENTS, AUGUST 1969.....	8.0085	HYDROMETEOROLOGICAL ANALYSIS OF SEVERE RAINSTORMS - ILLINOIS.....	12.0033
HURRICANE EFFECTS ON PORT FACILITIES.....	8.0076	HYGROSCOPIC SEEDING IN OKLAHOMA - VOLUME I.....	2.0009
HURRICANE MODELING.....	8.0062	IMPACT OF THE LUBBOCK STORM ON REGIONAL SYSTEMS - TEXAS.....	12.0040
HURRICANE MODIFICATION.....	8.0057	IMPACT VIBRATION DAMPERS IN A SEISMIC DESIGN.....	3.0038
HURRICANE MODIFICATION BY CLOUD SEEDING.....	8.0096	IMPLICATIONS OF ZONING AS AN URBAN WATER MANAGEMENT MEASURE - GEORGIA.....	6.0237
HURRICANE MODIFICATION RESEARCH (PROJECT STORMFURY).....	8.0107		

## PROJECT TITLE

IMPROVED BODY-WAVE MAGNITUDES OF ALEUTIAN EARTHQUAKES.....	3.0222	INVESTIGATION OF HIGHWAY BRIDGE DESIGN METHODOLOGY FOR PROVIDING STRUCTURAL RESISTANCE TO EARTHQUAKES.....	3.0222
IMPROVED OUTDOOR ALERTING AND WARNING.....	16.0039	INVESTIGATION OF LANDSLIDES ON HIGHWAYS.....	9.0218
IMPROVEMENT IN FLOOD-FREQUENCY ANALYSIS.....	6.0218	INVESTIGATION OF RED RIVER VALLEY GEOLOGY - EFFECTS ON STRUCTURE DESIGN AND PERFORMANCE.....	9.0227
IMPROVISING ELECTRIC POWER FROM INDUCTION GENERATORS DURING PROLONGED POWER OUTAGES.....	16.0027	INVESTIGATION OF SATELLITE OBSERVED TYPHOON-HURRICANE CLOUD CLUSTERS AND FLOW FEATURES.....	8.0227
INELASTIC BEHAVIOR OF STEEL BEAM-TO-COLUMN SUBASSEMBLAGES.....	3.0082	INVESTIGATION OF SCOUR AT BRIDGES IN ALASKA.....	6.0190
INELASTIC DESIGN OF BUILDING FRAMES TO RESIST EARTHQUAKES.....	3.0227	INVESTIGATION OF SHORELINE CHANGES AT SARGENT BEACH, TEXAS.....	15.0060
INELASTIC RESPONSE OF BUILDINGS AND STRUCTURAL RESTORATION.....	3.0190	INVESTIGATION OF THE MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS IN TENNESSEE.....	6.0083
INFLOW HYDROGRAPH STUDY - WYOMING.....	6.0060	INVESTIGATION ON ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA.....	6.0002
INFLUENCE OF BASE ROCK CHARACTERISTICS ON GROUND RESPONSE.....	3.0083	JACKSON HOLE FLOOD CONTROL PROJECT.....	6.0273
INFLUENCE OF NEGATIVE PORE PRESSURE DEVELOPMENT IN EXPANSIVE CLAYS ON DAMAGE TO MILITARY FACILITIES (ABBREV).....	4.0002	JAMAICA BAY HURRICANE BARRIER STUDY NEW YORK.....	8.0049
INFLUENCE OF SHAPE AND EMBEDMENT ON DYNAMIC FOUNDATION RESPONSE.....	3.0273	JEKYLL ISLAND, GEORGIA, BEACH EROSION CONTROL AND HURRICANE PROTECTION.....	15.0088
INITIAL OBSERVATIONS ON PROBLEMS AND DIFFICULTIES IN THE USE OF LOCAL EOC'S IN NATURAL DISASTERS.....	16.0049	JOINT FEDERAL-STATE CUMULUS SEEDING PROGRAM FOR MITIGATION OF 1971 SOUTH FLORIDA DROUGHT.....	2.0047
INITIAL RESULTS FROM THE UPPER WABASH SIMULATION MODEL.....	6.0088	JOINT PROBABILITY METHOD OF TIDE FREQUENCY ANALYSIS APPLIED TO ATLANTIC CITY AND LONG BEACH ISLAND, NEW JERSEY.....	8.0078
INITIAL WATER, SEWERAGE AND FLOOD INSTALLATION AND OPERATION OF A TELEMEETERED SEISMIC NETWORK ON THE ALASKA PENINSULA.....	3.0072	KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES.....	6.0117
INSTANTANEOUS UNIT HYDROGRAPH ANALYSIS OF HAWAIIAN SMALL WATERSHEDS.....	6.0078	KANSAS - NORTH SECTOR UPPER WALNUT WATERSHED BUTLER AND CHASE COUNTIES.....	6.0219
INSTRUMENTAL STRAIN - CALIFORNIA AND NEVADA.....	3.0117	KENNEDY SPACE CENTER OCEAN BEACH EROSION - FLORIDA.....	15.0366
INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA.....	6.0219	KINGSTON DISASTER URBAN RENEWAL PROJECT, BOROUGH OF KINGSTON, LUZERNE COUNTY, PENNSYLVANIA, HUD PROJECT NO. R-615C.....	6.0129
INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA.....	6.0366	LABORATORY STUDIES OF CONSERVATION AND DRAINAGE STRUCTURES.....	6.0140
INVESTIGATION AND ANALYSIS OF FLOODS FOR SMALL DRAINAGE AREAS IN NEW MEXICO.....	6.0129	LABORATORY STUDIES OF THE EFFECTS OF PHYSICAL HAZARD ON SHELTER MANAGEMENT BEHAVIOR - PHASE I - STUDY PLAN.....	16.0222
INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL WATERSHEDS IN OKLAHOMA.....	6.0140	LAKE HYDROLOGY.....	6.0059
INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN SOUTH CAROLINA.....	6.0222	LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY - HURRICANE PROTECTION PROJECT.....	8.0189
INVESTIGATION AND ANALYSIS OF FLOODS FROM SMALL DRAINAGE AREAS IN OHIO.....	6.0059	LAKE SHORE EROSION IN ILLINOIS.....	15.0209
INVESTIGATION FOR FLOOD PROTECTION OF BRIDGES.....	6.0189	LAND SUBSIDENCE STUDIES IN THE SAN JOAQUIN VALLEY - CALIFORNIA.....	10.0209
INVESTIGATION OF ERTS-A IMAGES FOR APPLICATION TO THEMATIC MAPPING, MISSISSIPPI RIVER.....	6.0209	LAND-SUBSIDENCE STUDIES IN CALIFORNIA TO STUDY THE EXTENT, MAGNITUDE, PATTERN AND EFFECTS OF SUBSIDENCE.....	10.0209

LAND-USE REGULATIONS IN FLOOD-PRONE AREAS & A SUMMARY OF THE WISCONSIN STUDY AND AN ANALYSIS OF ALABAMA LAND-USE LAW.....	6.0162	MARINE CONDITIONS AND AUTOMATED FORECASTS FOR THE ATLANTIC COASTAL STORM OF FEBRUARY 18-20, 1972.....	8.0115
LANDFALL ERRORS IN HURRICANE FORECASTS.....	8.0094	MARINE ENVIRONMENTAL PREDICTION.....	8.0113
LANDSLIDE STUDIES IN SOUTH DAKOTA - REPORT NO. 1 - LOCATION OF AREAS WITH HIGH LANDSLIDE POTENTIAL IN THE PIERRE SHALE.....	9.0022	MASS PROPERTIES OF OIL FIELD ROCKS - CALIFORNIA.....	10.0015
LANDSLIDES - KENTUCKY.....	9.0015	MEASURE AND DEPICT TROUBLE AREAS IN STEREO-MODELS - OHIO.....	10.0031
LANDSLIPS IN SOUTHEASTERN OHIO.....	9.0057	MEASUREMENT AND ANALYSIS OF FARM RISKS, LOSSES, AND INSURANCE.....	7.0062
LARGE SCALE INTEGRATION IN URBAN PLANNING WITH APPLICATIONS TO TALL BUILDING PLANNING IN REGIONS SUBJECTED TO NATURAL HAZARDS.....	3.0257	MEASUREMENT AND EVALUATION OF SUBSIDENCE OVER A COAL MINE WITH VARYING OVERBURDEN THICKNESS.....	10.0024
LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN.....	6.0294	MEASUREMENT OF DYNAMIC CHARACTERISTICS OF SWITCHYARD EQUIPMENT.....	3.0046
LEGAL ISSUES ON ECONOMIC UTILIZATION OF THE CONNECTICUT RIVER FLOOD PLAINS.....	6.0293	MEASUREMENT OF MOVEMENT ON THE SAN ANDREAS FAULT.....	3.0155
LIFE CYCLE OF FLORIDA KEYS' WATERPOUTS.....	12.0025	MEASUREMENTS FOR FAULT SLIP ON THE DENALI, FAIRWEATHER, AND CASTLE MOUNTAIN FAULTS, ALASKA.....	3.0259
LIME SOIL STABILIZATION STUDY.....	9.0037	MEASUREMENTS OF DYNAMIC CHARACTERISTICS OF MULTISTORY BUILDINGS IN CALIFORNIA.....	3.0010
LIQUEFACTION SUSCEPTIBILITY OF SOILS UNDER DYNAMIC AND STATIC LOADING.....	3.0234	MECHANICS OF DEBRIS AVALANCHING IN SHALLOW TILL SOILS OF SOUTHEAST ALASKA.....	9.0024
LITERATURE SURVEY-SEISMIC EFFECTS ON HIGHWAY BRIDGES.....	3.0003	MECHANISMS OF WILDLAND FIRE SUPPRESSION.....	5.0024
LOCATION OF SLOPE FAILURE PLANES.....	9.0009	MEETING THE EARTHQUAKE CHALLENGE - FINAL REPORT TO THE LEGISLATURE STATE OF CALIFORNIA BY THE JOINT COMMITTEE ON SEISMIC SAFETY.....	3.0150
LOCK HAVEN URBAN RENEWAL PROJECT, LOCK HAVEN, PENNSYLVANIA.....	6.0024	MEMORABLE HURRICANES OF THE UNITED STATES SINCE 1973.....	8.0016
LONG-PERIOD WAVES AND SURGES.....	13.0019	MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES, COMMONWEALTH OF PENNSYLVANIA.....	6.0011
LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON.....	3.0267	MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN LUZERNE-WYOMING COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA.....	6.0009
LOW-CYCLE FATIGUE FAILURE OF SEISMIC STRUCTURES.....	3.0027	MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN CENTRAL REGION, COMMONWEALTH OF PENNSYLVANIA.....	6.0008
LUBBOCK TORNADO - A SURVEY OF BUILDING DAMAGE IN AN URBAN AREA - TEXAS.....	12.0004	MERAMEC PARK LAKE, UPPER MISSISSIPPI RIVER BASIN, MERAMEC RIVER, MISSOURI.....	6.0320
MACADOO ROAD-FILL DAM, KANSAS.....	6.0203	METEOROLOGICAL AND HYDROLOGICAL ANALYSIS OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD.....	6.0021
MAGNITUDE AND FREQUENCY OF FLOOD DISCHARGES FROM SMALL DRAINAGE BASINS, EFFECTS OF DRAINAGE BASIN CHARACTERISTICS - NORTH DAKOTA.....	6.0138	METEOROLOGICAL DROUGHT IN TENNESSEE.....	2.0024
MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN IDAHO.....	6.0254	METHODOLOGY AND PILOT APPLICATION.....	3.0230
MAGNITUDE AND FREQUENCY OF FLOODS IN UTAH.....	6.0392	METHODS FOR THE PREVENTION AND CONTROL OF LIGHTNING FIRES.....	5.0019
MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL STREAMS - NORTH DAKOTA.....	6.0344	METROPOLITAN WATER SYSTEM OPERATION SUBSEQUENT TO NUCLEAR ATTACK OR NATURAL DISASTER.....	16.0105
MAGNITUDE AND FREQUENCY OF FLOODS ON SMALL DRAINAGE AREAS IN FLORIDA.....	6.0233		
MAGNITUDE RECURRENCE RELATION FOR CENTRAL MISSISSIPPI VALLEY EARTHQUAKES.....	3.0237		
MALIBU BEACH QUADRANGLE AND THE UNINCORPORATED PART OF THE			

MICROSEISMICITY AND TECTONICS OF THE NEVADA SEISMIC ZONE.....	3.0258
MICROWAVE METEOROLOGY.....	8.0104
MILITARY BLOOD BANKING (CIVIL DISASTERS).....	16.0007
MILTON SOUTH, MILTON NORTH AND TURBOT TOWNSHIP DISASTER, URBAN RENEWAL PROJECTS, PENNSYLVANIA.....	6.0027
MINIMIZING DAMAGE TO REFINERIES FROM NUCLEAR ATTACK, NATURAL AND OTHER DISASTERS.....	16.0044
MISSISSIPPI BASIN MODEL.....	6.0313
MISSISSIPPI DELTA TORNADOES OF FEBRUARY 21, 1971 - A REPORT TO THE ADMINISTRATOR.....	12.0015
MOBILIZATION OF DEBRIS FLOWS 9973-EN.....	9.0003
MODAL COUPLING AND EARTHQUAKE RESPONSE OF TALL BUILDINGS.....	3.0141
MODEL CITIES ONE - URBAN RENEWAL PROJECT, READING, PENNSYLVANIA.....	6.0025
MODEL STUDY OF CANNELTON LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY.....	6.0312
MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS - PHASE III.....	6.0153
MODIFICATION OF SEISMOGRAPH RECORDS FOR EFFECTS OF LOCAL SOIL CONDITIONS.....	3.0093
MONITORING FLOOD DAMAGE WITH SATELLITE IMAGERY.....	6.0030
MONTEREY BAY - CALIFORNIA.....	9.0030
MONTEREY-POINT REYES (EARTHQUAKE) - CALIFORNIA.....	3.0120
MORGAN CITY, LOUISIANA, AND VICINITY (FRANKLIN AND VICINITY AREA).....	6.0099
MORPHOLOGY OF TWO TORNADIC STORMS - AN ANALYSIS OF NSSL DATA ON APRIL 30, 1970 - OKLAHOMA CITY, OKLAHOMA.....	12.0007
MOUNTAIN SOILS, FRONT RANGE URBAN CORRIDOR.....	6.0185
MYRTLE BEACH, S.C. - COMPREHENSIVE DEVELOPMENT PLAN.....	6.0363
NATIONAL ATMOSPHERIC SCIENCES PROGRAM - FISCAL YEAR 1974.....	16.0076
NATIONAL EARTHQUAKE INFORMATION SERVICE.....	3.0051
NATIONAL EAST COAST WINTER STORMS - OPERATIONS PLAN.....	12.0013
NATIONAL EAST COAST WINTER STORMS OPERATIONS PLAN.....	11.0004
NATIONAL FIRE DANGER RATING.....	5.0027
NATIONAL HAIL RESEARCH EXPERIMENT - COLORADO, NEBRASKA, WYOMING.....	7.0014
NATIONAL HAIL RESEARCH EXPERIMENT SUPPORT FOR 1973 - COLORADO.....	7.0010
NATIONAL HURRICANE OPERATION PLAN.....	8.0020
NATIONAL HURRICANE OPERATIONS PLAN 1974.....	8.0021
NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING, SAN FERNANDO DATA PROCESSING.....	3.0042
NATIONAL SEARCH AND RESCUE	

NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN.....	12.
NATIONAL SHORELINE STUDY - GREAT LAKES REGION INVENTORY REPORT.....	15.
NATIONAL SHORELINE STUDY - INVENTORY REPORT - LOWER MISSISSIPPI REGION.....	15.
NATURAL CAPABILITIES - THE FRIENDS CREEK SERIES, MACON COUNTY, ILLINOIS.....	6.
NATURAL CHARACTERISTICS OF COLUMBIA COUNTY, NEW YORK STATE.....	6.
NATURAL DISASTER ANALYSIS FOR LATAH COUNTY, IDAHO, JUNE 1973.....	6.
NATURAL DISASTER OPERATIONS PLANNING.....	16.
NATURAL DISASTERS - SOME EMPIRICAL AND ECONOMIC CONSIDERATIONS.....	16.
NATURAL DISASTERS OPERATIONS PLANNING FOR SLOWLY DEVELOPING DISASTERS, VOLUME I.....	8.
NATURAL ENVIRONMENTAL HAZARDS AND THEIR RELATIONSHIPS TO PLANNING, LOCATION AND DESIGN OF TRANSPORTATION FACILITIES.....	16.
NAVY ENVIRONMENT - FLUID MECHANICS RESEARCH.....	8.
NAVY ENVIRONMENT - INVESTIGATIONS OF GENERATION OF OCEAN WAVES AND OF RESONANT RESPONSE OF HARBORS TO TSUNAMIS AND OTHER LONG WAVES.....	13.
NEBRASKA DROUGHTS - A STUDY OF THEIR PAST CHRONOLOGICAL AND SPATIAL EXTENT WITH IMPLICATIONS FOR THE FUTURE.....	2.
NEW ENGLAND RIVER BASINS COMMISSION, ANNUAL REPORT, FISCAL YEAR 1971.....	6.
NEW LONDON HURRICANE PROTECTION PROJECT, NEW LONDON, CONNECTICUT.....	8.
NEW MADRID EARTHQUAKE - ARKANSAS, ILLINOIS, KENTUCKY, MISSISSIPPI, MISSOURI AND TENNESSEE.....	3.
NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE PROTECTION.....	8.
NEW TECHNIQUES FOR DELINEATION OF FLOOD PLAIN HAZARD ZONES - SOIL SURVEYS.....	6.
NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAMES AND PANELS.....	3.
NONLINEAR AND COUPLED SEISMIC EFFECTS.....	3.
NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS.....	1.
NORTH RICHMOND - SAN PABLO BAY AREA STUDY - CALIFORNIA.....	6.
NUMERICAL ANALYSIS OF TORNADO WIND LOADS ON BUILDINGS - TEXAS.....	12.
NUMERICAL SIMULATION OF TSUNAMIS.....	13.
NUMERICAL STUDIES IN THE CIRCULATIONS AND STORM SURGES IN LAKE ONTARIO.....	8.
NUMERICAL STUDIES OF RAINBAND CIRCULATIONS IN TROPICAL CYCLONES.....	8.
NUMERICAL STUDIES OF UNSTEADY FLOW IN THE JAMES RIVER - VIRGINIA.....	6.

SEDIMENT ACCUMULATION IN THE BEAVER ZONES - ALASKA, NEW ENGLAND .....	15.0022	EARTHQUAKE OF FEBRUARY 9, 1971 - PERRIS VALLEY URBAN HYDROLOGY STUDY, CALIFORNIA .....
COHO RIVER BASIN SURVEY, MAIN REPORT & DEVELOPMENT PROGRAM, COMMUNICATION FROM CHAIRMAN, U. S. WATER RESOURCES COUNCIL (ABBREV) .....	6.0228	PHYSICAL CHARACTERISTICS OF CHAM AS A WILDLAND FUEL - CALIFORNIA .....
OKLAHOMA DROUGHT RELIEF OPERATIONAL PROGRAM (ODROP) .....	2.0006	PHYSICAL EVALUATION OF CLOUD SE TECHNIQUES FOR MODIFYING OROGRAPHIC SNOWFALL - THE CASO PROJECT .....
ON ESTIMATION OF MAXIMUM WIND SPEEDS IN TORNADOES AND HURRICANES .....	16.0057	PHYSICAL PROPERTIES OF ALPINE SNOW RELATED TO WEATHER AND AVALANCHE CONDITIONS .....
OPERATING PLAN FOR FIRE WEATHER SERVICE IN SOUTH CAROLINA .....	5.0031	PHYSICAL, CHEMICAL, AND PHYSIOLOGICAL PROPERTIES OF FUELS RELATED TO PHENOMENA .....
OPERATION AGNES .....	8.0135	PILOT STUDY OF FLOOD PLAIN MANAGEMENT - WASHINGTON .....
OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, MASSACHUSETTS .....	8.0035	PLAN FOR AN IMPROVED COMMUNICATIONS SYSTEM SERVING EMERGENCY SERVICE DEPARTMENTS THE CITY OF LOS ANGELES (ABBREV) .....
OPERATION AND MAINTENANCE OF NEW BEDFORD HURRICANE BARRIER, NEW BEDFORD, MASSACHUSETTS .....	8.0036	PLAN FORMULATION AND EVALUATION OF MULTIPLE PURPOSE WATER RESOURCE PROJECT - A FRAMEWORK FOR REGIONAL PLANNING (ABBREV) .....
OPERATIONS OF THE NATIONAL WEATHER SERVICE .....	16.0092	PLAN TO IMPROVE LOCAL WEATHER FORECASTS .....
OPSET - PROGRAM FOR COMPUTERIZED SELECTION OF WATERSHED PARAMETER VALUES FOR THE STANFORD WATERSHED MODEL .....	6.0285	PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MODULATED' D IOWA'S LARGE RESERVOIR SYSTEMS .....
OPTIMAL ANTECEDENT PRECIPITATION INDEXES FOR SMALL EASTERN WATERSHEDS .....	6.0144	PORT ARTHUR HURRICANE FLOOD PROTECTION, PORT ARTHUR AND VICINITY, TEXAS .....
OPTIMAL FLOOD ROUTING USING STOCHASTIC DYNAMIC PROGRAMMING .....	6.0150	POTENTIAL OF PRECIPITATION MODIFICATION IN MODERATE TO SEVERE DROUGHTS .....
OPTIMIZATION OF OPERATION OF A SYSTEM OF FLOOD CONTROL RESERVOIRS .....	6.0123	PREDICTED SAN FERNANDO EARTHQUAKE SPECTRA - GLENDALE AREA .....
OPTIMIZATION OF WATER RESOURCE SYSTEMS INCORPORATING EARTHQUAKE RISK .....	3.0102	PREDICTION OF HURRICANE DEVELOPMENT AND MOVEMENT WITH A BAROCLINIC MODEL .....
OPTIMUM DESIGN OF EARTHQUAKE- RESISTANT SHEAR BUILDINGS .....	3.0090	PREDICTION OF THE MAGNITUDES AND FREQUENCIES OF FLOODS IN MICHIGAN PRELIMINARY CLIMATIC DATA REPORT HURRICANE AGNES JUNE 14-23, 1972 .....
OPTIMUM UTILIZATION OF GOVERNMENT AND NON-GOVERNMENT COMMUNICATIONS RESOURCES .....	16.0037	PRELIMINARY INVESTIGATION OF STRUCTURAL DAMAGE FROM POINT MUGU, CALIFORNIA EARTHQUAKE OF FEBRUARY 21, 1973 .....
ORANGE, SEMINOLE, OSCEOLA COUNTIES - WATER MANAGEMENT .....	6.0072	PRELIMINARY REPORT ON AN ANALYSIS PROJECT II DATA (WAVE FORCES ON PILE), HURRICANE CARLA, GULF OF MEXICO .....
ORGANIZATIONAL RESPONSES TO MAJOR COMMUNITY CRISES .....	16.0100	
OSO CREEK TECHNICAL ASSISTANCE STUDY - PRELIMINARY STUDY ON THE PROBLEMS AND OPPORTUNITIES FOR DEVELOPMENT OF OSO CREEK AND OSO BAY .....	6.0380	
PACIFIC TSUNAMI CATALOG .....	13.0021	
PALACIOS COMPREHENSIVE PLAN - PHASE 2 - SUMMARY REPORT .....	6.0385	
PALO ALTO, SAN MATEO, AND MONTARA MOUNTAIN 7-1/2-MINUTE QUADRANGLES AND VICINITY, CALIFORNIA .....	3.0121	



# PROJECT TITLE

PRELIMINARY STORM DRAINAGE AND FLOOD CONTROL PLAN - UNION COUNTY, NJ .....	6.0127	PUBLIC SAFETY SUBSYSTEM - VOLUME I - ANALYSIS OVERVIEW .....	16
PRESCRIBED FIRE TECHNOLOGY FOR THE SOUTHWEST .....	5.0002	PUGET PEAK AVALANCHE, ALASKA .....	1
PRESENT AND POTENTIAL MULTIPLE USES OF CANAL SYSTEMS - PHASE I .....	6.0154	PUGET SOUND, WASHINGTON, EARTHQUAKE AND THE MANTLE STRUCTURE BENEATH THE NORTHWESTERN UNITED STATES .....	3
PRIORITY AND PLANNING ELEMENTS FOR DEVELOPING ILLINOIS WATER RESOURCES .....	6.0262	PUTNAM COUNTY OFFICIAL MAP - PROPOSALS FOR REVISION AND EXPANSION .....	6
PROBABILISTIC ANALYSIS OF ELASTO-PLASTIC STRUCTURES .....	3.0215	QUASI-STATIC LATERAL DESIGN LOADS FOR EARTHQUAKE RESISTANT STRUCTURES .....	3
PROBABILISTIC METHODS IN CIVIL ENGINEERING .....	3.0208	RADAR METEOROLOGY AS A MODERN TOOL FOR FOREST FIRE PROTECTION .....	5
PROBABILISTIC MODELING OF EXTREME LOADS .....	3.0213	RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS .....	6
PROBABILITY FIRE WEATHER FORECASTS SHOW PROMISE IN 3-YEAR TRIAL .....	5.0039	RAINWATER CONTAMINATION BY VOLCANIC VOLATILES FROM KILAUEA VOLCANO, HAWAII (PHASE I) .....	14
PROBABILITY OF FATIGUE FAILURE UNDER EARTHQUAKE LOADS .....	3.0251	RANGELY - CALIFORNIA .....	3
PROBABLE MAXIMUM PRECIPITATION AND SNOWMELT CRITERIA FOR RED RIVER OF THE NORTH ABOVE PEMBINA AND SOURIS RIVER ABOVE MINOT, NORTH DAKOTA .....	6.0290	RATE OF LOADING EFFECTS ON UNCRACKED AND REPAIRED REINFORCED CONCRETE MEMBERS .....	3
PROBING THE LAW AND BEYOND - A QUEST FOR PUBLIC PROTECTION FROM HAZARDOUS PRODUCT CATASTROPHES .....	16.0004	RE-DRAFT OF SEEKONK ZONING BY LAW, 15 NOVEMBER 1969 .....	6
PROCEDURES FOR ESTIMATING FLOOD FLOWS FROM SMALL RURAL WATERSHEDS .....	6.0177	RECENT TSUNAMI THEORY .....	13
PROCEEDINGS - COMMUNITY WORKSHOP ON FLOOD INSURANCE .....	6.0012	RECOMMENDATIONS DEVELOPED FROM REPORTS OF THE EARTHQUAKE COMMISSION AND EARTHQUAKE TASK FORCES - SAN FERNANDO EARTHQUAKE (ABBREV) .....	3
PROFILE OF A STORM - WIND, WAVES AND EROSION ON THE SOUTHEASTERN SHORE OF LAKE MICHIGAN .....	15.0025	RECOMMENDED REGIONAL PLAN FOR SEWERAGE, WATER SUPPLY AND STORM DRAINAGE - CONNECTICUT .....	6
PROFILING THE FOREST INCENDIARIST - AN ANALYSIS OF DOCUMENTED CASE HISTORIES .....	5.0001	RECONNAISSANCE ENGINEERING GEOLOGY OF THE SITKA AREA, ALASKA .....	13
PROGRAM DESIGN-1971 - SAN FRANCISCO BAY REGION ENVIRONMENT AND RESOURCES PLANNING STUDY .....	16.0075	RECONNAISSANCE STUDY OF RECOVERABLE GROUND WATER .....	3
PROGRAM FOR HYDROLOGIC INVESTIGATION OF SMALL DRAINAGE AREAS IN TEXAS .....	6.0061	RECOVERY FROM NATURAL DISASTERS - INSURANCE OR FEDERAL AID .....	16
PROJECT ARID DROP, A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS INCORPORATED (ABBREV) .....	2.0008	RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS .....	6
PROJECT STORMFURY ANNUAL REPORT 1971 .....	8.0095	REDESIGNING FLOOD MANAGEMENT - PROJECT AGNES - PHASE I .....	6
PROPERTIES AND STABILITY OF A TEXAS BARRIER BEACH INLET .....	15.0035	REDUCING FIRE HAZARD IN PONDEROSA PINE THINNING SLASH BY MECHANICAL CRUSHING - OREGON .....	5
PROPOSED CHARACTERIZATION OF TORNADOES AND HURRICANES BY AREA AND INTENSITY .....	12.0031	REGIONAL AND DETAILED GRAVITY STUDIES IN TECTONICALLY ACTIVE AREAS - CALIFORNIA .....	3
PROTECTION OF NARRAGANSETT BAY FROM HURRICANE SURGES .....	8.0047	REGIONAL CODE ENFORCEMENT - HANCOCK, HARRISON AND JACKSON COUNTIES, MISSISSIPPI .....	8
PROTECTION OF TRANSPORTATION FACILITIES AGAINST EARTHQUAKES .....	3.0199	REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES IN NEW YORK .....	6
PUBLIC CHOICE AND THE DISTRIBUTION OF BENEFITS AND COSTS OF FLOOD PLAIN REGULATION - VIRGINIA .....	6.0397	REGIONAL EARTHQUAKE RISK STUDY - MISSOURI, ARKANSAS, KENTUCKY, TENNESSEE, MISSISSIPPI AREA .....	3
RAINFALL-RUNOFF RELATIONS ON URBAN AND RURAL AREAS .....		REGIONAL EARTHQUAKE RISK STUDY, TECHNICAL REPORT .....	

APRIL 8, 1968 - CALIFORNIA (ABBREV).....	3.0113	FERNANDO VALLEY EARTHQUAKE OF 9 FEBRUARY 1971.....	3.0021
REGIONAL VOLCANOLOGY - WESTERN UNITED STATES INCLUDING ALASKA AND HAWAII.....	14.0014	RESPONSE OF TWO IDENTICAL SEVEN- STORY STRUCTURES TO THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971.....	3.0014
REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES - VOLUME I, PARTS I-IV.....	6.0226	RESPONSE OF WATER LEVELS TO FLOOD CONTROL OPERATIONS IN SOUTHEASTERN FLORIDA.....	6.0068
REGULATION OF GREAT LAKES WATER LEVELS - A SUMMARY REPORT/1974.....	16.0040	RETURNING UNDERGROUND COAL MINE WASTES TO MINED-OUT VOIDS.....	10.0026
REGULATION OF GREAT LAKES WATER LEVELS REPORT TO THE INTERNATIONAL JOINT COMMISSION BY THE INTERNATIONAL GREAT LAKES LEVELS BOARD.....	6.0052	REVIEW EMERGENCY RELIEF FILES AND SURVEY THE TREND OF BRIDGE LOSSES DURING STORM CONDITIONS.....	6.0155
RELATION OF CLIMATIC AND WATERSHED CHARACTERISTICS TO STORM RUNOFF IN THE EDWARDS PLATEAU - TEXAS.....	6.0388	REVIEW OF LITERATURE ON EXPANSIVE CLAY SOILS.....	4.0003
RELATIVE ACTIVITY OF MULTIPLE FAULT STRANDS - CALIFORNIA.....	3.0105	RIPRAP SLOPE PROTECTION FOR EARTH DAMS - A REVIEW OF PRACTICES AND PROCEDURES.....	9.0008
RELATIVE SPECTRA OF TSUNAMIS.....	13.0022	RISK MAPS AND FIELD INVESTIGATIONS.....	3.0163
REMOTE SENSING APPLICATIONS IN HYDROLOGY AND GEOLOGY.....	9.0050	ROCK MECHANICS STUDY OF SHORTWALL MINING - KENTUCKY.....	10.0007
REMOTE SENSING FOR GEOLOGIC HAZARDS AND DISASTERS, MINE AREA CONSERVATION, SOIL MAPPING AND LAND USE PLANNING.....	9.0035	ROCK STRENGTH FROM FAILURE CASES.....	9.0054
REMOTE SENSING FOR RESOURCE MANAGEMENT AND FLOOD PLAIN DELINEATION.....	6.0412	ROCK STRENGTH FROM FAILURE CASES - POWERHOUSE SLOPE STABILITY STUDY, FORT PECK DAM, MONTANA.....	9.0021
REMOTE SENSING, ALFAFIA AND PEACE RIVER BASINS, FLORIDA.....	10.0029	ROLE PERFORMANCE IN THE OPERATING SYSTEM - CIVIL DEFENSE OPERATIONS IN DISASTER.....	16.0086
REPORT INTO SELECTED AREAS OF ECONOMIC IMPACT OF THE CALIFORNIA EARTHQUAKE FOR THE OFFICE OF EMERGENCY PREPAREDNESS (ABBREV).....	3.0022	RUNOFF FROM SMALL AGRICULTURAL AREAS IN ILLINOIS.....	6.0265
REPORT OF THE TASK FORCE ON EARTHQUAKE HAZARD REDUCTION PROGRAM PRIORITIES.....	3.0200	RUNOFF SIMULATION.....	6.0156
REPORT ON EARTHQUAKE INSURANCE TO CONGRESS OF UNITED STATES - PURSUANT TO SECTION FIVE OF SOUTHEAST HURRICANE DISASTER RELIEF ACT 1965.....	3.0196	SAN ADREAS FAULT - CALIFORNIA COOP.....	3.0111
REPORT TO THE CONGRESS - DISASTER PREPAREDNESS.....	16.0077	SAN FRANCISCO BAY.....	15.0013
REPORTS OF THE EARTHQUAKE TASK FORCES - RECOMMENDATIONS OF THE LOS ANGELES COUNTY EARTHQUAKE COMMISSION.....	3.0004	SAN GORGONIO PASS, CALIFORNIA GENERAL PLAN TECHNICAL REPORT.....	6.0042
RESEARCH AND DEVELOPMENT OF FIRE PREVENTION TECHNOLOGY (FIRE PREVENTION).....	5.0017	SANTA ANA RIVER BASIN, FLOOD CONTROL PROJECT, EAST TWIN AND WARM CREEK IMPROVEMENT.....	6.0172
RESEARCH IN EARTH STRAINS AND FOCAL MECHANISMS - MISSOURI.....	3.0240	SANTA CRUZ COUNTY COOP.....	3.0106
		SARASOTA - ZONING AND SUBDIVISION CONTROLS - REVIEW, ANALYSIS, AND RECOMMENDATIONS CONCERNING CURRENT REGULATIONS.....	6.0231
		SATELLITE VOLCANO SURVEILLANCE - ALASKA, HAWAII AND WASHINGTON.....	14.0002
		SEA COAST PLANNING PROJECT - CALIFORNIA.....	6.0182
		SEA-AIR INTERACTION LABORATORY OPERATIONS.....	8.0065
		SEA-CLIFF EROSION STUDIES, MASSACHUSETTS.....	15.0023
		SEARCH AND RESCUE COMMUNICATION- GLOBAL RESCUE ALARM NET (GRAN).....	16.0010

## PROJECT TITLE

SECURING COMMUNITY RESOURCES FOR SOCIAL ACTION .....	16.0087	SHEAR MODULUS AND DAMPING IN SOILS MEASUREMENT AND PARAMETER EFFECTS .....
SEDIMENT MOVEMENT AND HILLSLOPE MORPHOLOGY IN THE CENTRAL APPALACHIAN REGION - VIRGINIA .....	15.0039	SHEAR STRENGTH DECAY IN REINFORCED CONCRETE COLUMNS SUBJECTED TO LARGE DEFLECTION REVERSALS .....
SEISMIC ACTIVITY OF THE CASCADE VOLCANOES .....	14.0016	SHEAR STRENGTH OF FINE-GRAINED SOILS WEST POINT, NEW YORK .....
SEISMIC BEHAVIOR OF FRAMED TUBES .....	3.0207	SHORE EROSION STUDIES ALONG THE OHIO SHORE OF LAKE ERIE .....
SEISMIC DESIGN DECISION ANALYSIS FOR EASTERN METROPOLITAN AREAS .....	3.0229	SHORE EROSION STUDY OF ERIE COUNTY, OHIO .....
SEISMIC DESIGN FOR BUILDINGS .....	3.0187	SHORE EROSION STUDY OF LAKE COUNTY, OHIO .....
SEISMIC DESIGN OF BUILDING STRUCTURES .....	3.0254	SHORT-TERM CLIMATE CHANGES AND COASTAL EROSION, BARROW, ALASKA
SEISMIC DESIGN OF LOW-RISE BUILDINGS .....	3.0059	SILVER VALLEY FLOOD - SOCIAL PSYCHOLOGICAL EFFECTS .....
SEISMIC GROUND EFFECTS IN THE LIGHT OF NEW THEORIES OF TECTONICS AND EARTHQUAKE MECHANISM .....	3.0226	SIMULATION MODEL FOR STORM CYCLES AND BEACH EROSION ON LAKE MICHIGAN
SEISMIC HAZARD REGIONALIZATION AND PROBABILITY OF FUTURE EARTHQUAKES IN THE UNITED STATES .....	3.0268	SLOPE STABILITY OF CERTAIN SELECTED COLLUVIAL SOILS .....
SEISMIC HAZARDS AND LAND-USE PLANNING .....	16.0074	SLOPE STABILITY OF CUTS IN ONTONAGON CLAY .....
SEISMIC MOTION-DAMAGE RELATIONSHIPS FOR LOW RISE BUILDINGS - COLORADO .....	3.0016	SMALL STREAM FLOOD CHARACTERISTICS
SEISMIC RESEARCH .....	3.0225	SMALL STREAMS FLOOD FREQUENCY IN MAINE .....
SEISMIC RESISTANCE OF CONCRETE SLAB TO COLUMN AND WALL CONNECTIONS .....	3.0282	SNAKE RIVER BASIN, PART F - SOUTHERN PART, NORTHWEST MARGIN - IDAHO
SEISMIC RISK - FDAA - WASHINGTON AND UTAH .....	3.0020	SNAKE RIVER PLAIN, PART A - REGIONAL TECTONICS - IDAHO .....
SEISMIC RISK CORPS OF ENGINEERS - CONTIGUOUS UNITED STATES .....	3.0164	SNAKE RIVER PLAIN, PART B - VOLCANIC ROCKS - IDAHO .....
SEISMIC RISK STUDIES IN THE UNITED STATES .....	3.0219	SNAKE RIVER PLAIN, PART E - NORTH CENTRAL - IDAHO .....
SEISMIC SOURCE STUDIES - CALIFORNIA .....	3.0130	SNOW AND ICE DETECTION AND WARNING SYSTEMS .....
SEISMIC STUDIES - SOUTH CENTRAL ILLINOIS EARTHQUAKE OF NOVEMBER 9, 1968 .....	3.0241	SNOW FORECASTING FOR SOUTHEASTERN WISCONSIN .....
SEISMIC SURVEILLANCE OF AUGUSTINE REIDOUT AND SPURR VOLCANOES, COOK INLET, ALASKA .....	14.0005	SNOW PACK STABILITY INDICES RELATIVE TO THE CLIMAX AVALANCHE .....
SEISMICITY AND CONTEMPORARY TECTONICS OF THE YELLOWSTONE PARK-HELDEN LAKE REGION .....	3.0275	SOCIALLY DEFINED ENVIRONMENTAL VALUES IN URBAN WATER RESOURCES PLANNING .....
SEISMICITY AND EARTH STRUCTURE .....	3.0167	SOCIO-ECONOMIC IMPLICATIONS OF ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA .....
SEISMICITY INVESTIGATIONS IN THE CASCADE MOUNTAINS AND VICINITY, OREGON, 1 MAY 1969 - 30 APRIL 1970 .....	3.0266	SOCIOLOGICAL IMPACT OF A FLOOD CONTROL RESERVOIR .....
SEISMICITY OF MENDOCINO ESCARPMENT-GORDA RIDGE REGION - CALIFORNIA .....	3.0080	SOCORRO 2 DEGREE QUADRANGLE - NEW MEXICO .....
SEISMICITY OF THE SOUTHERN NEVADA REGION, DECEMBER 22, 1971 TO JULY 1, 1972 .....	3.0245	SOIL AND WATER CONSERVATION NEEDS INVENTORY, COOKE, GRAYSON AND FANNIN COUNTIES, TEXAS .....
SEISMICITY STUDIES OF THE CENTRAL APPALACHIAN REGION .....	3.0277	SOIL BEHAVIOR UNDER EARTHQUAKE LOADING CONDITIONS .....
SEISMOLOGY AND GLOBAL TECTONICS - A STUDY OF SEISMICITY GAPS AND INTRAPLATE EARTHQUAKES .....	3.0261	SOIL ENGINEERING RESEARCH - CALIFORNIA .....
SENSITIVITY ANALYSES AND GRAPHICAL METHOD FOR PRELIMINARY SOLUTIONS .....	3.0062	

SOIL-BEAM FITTING AND MANAGEMENT	7.0004	CYCLES FLEXURAL MOMENTS	3.0073
SPACE-TIME VARIATIONS IN HIGH INTENSITY RAINFALL ON THE WINDWARD COAST OF THE ISLAND OF HAWAII (PHASE III)	6.0246	STOCHASTIC INELASTIC RESPONSE OF OFFSHORE TOWERS TO STRONG MOTION EARTHQUAKES	6.0167
SPECIAL FLOOD DATA COLLECTION, HAWAII	6.0249	STORAGE REQUIREMENTS TO CONTROL FLOOD FLOWS OF MISSOURI STREAMS	3.0033
SPECIAL FLOOD REPORTS - MISSISSIPPI	6.0115	STORM CHARACTERISTICS AND RAINFALL INTENSITY IN WEST VIRGINIA	6.0318
SPECIAL FLOOD-DATA COLLECTION - HAWAII	6.0251	STORM SURGE ON THE OPEN COAST - FUNDAMENTALS AND SIMPLIFIED PREDICTION	6.0406
SPECIAL MICROEARTHQUAKE NETWORKS - ALABAMA AND TEXAS	3.0125	STORM SURGE RESEARCH	8.0072
SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - I. LANDFALL STORMS	8.0110	STORM-SURGE FORECASTING	8.0060
SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES - PART 2. GENERAL TRACK AND VARIANT STORM CONDITIONS	8.0111	STRAIN STUDIES - CALIFORNIA, NEVADA, MONTANA	8.0136
SPECTRAL CHARACTERISTICS AND STRESS DROP FOR MICROEARTHQUAKES NEAR FAIRVIEW PEAK, NEVADA	3.0249	STRAINS AND TILTS ASSOCIATED WITH THE SAN FERNANDO EARTHQUAKE	3.0126
SPEWRELL BLUFF LAKE, FLINT RIVER, GEORGIA	6.0033	STREAMFLOW CHARACTERISTICS, KANSAS	3.0145
SPILLWAY DESIGN FLOODS FOR SMALL DAMS IN RURAL MISSOURI	6.0122	STREAMFLOW PATTERNS WATERSHED CHARACTERISTICS THROUGH USE OF OPSET - A SELF CALIBRATING VERSION OF STANFORD WATERSHED MODEL (ABBREV)	6.0090
STABILITY AND DYNAMIC RESPONSE OF COOLING TOWERS	3.0068	STREAMFLOW SIMULATION AND FLOOD PROFILE DETERMINATION IN OHIO - A PILOT STUDY	6.0092
STABILITY OF RUBBLE-MOUND TSUNAMI BARRIER HILO HARBOR, HAWAII. HYDRAULIC MODEL INVESTIGATION	13.0009	STREAMFLOW VARIABILITY - ILLINOIS	6.0348
STABILIZATION OF EXPANSIVE CLAYS AND SHALES	4.0007	STREAMS AND DRAINAGE BASINS - FULTON COUNTY, NEW YORK	6.0263
STABILIZATION OF STEEP LAND SLOPES - OHIO	9.0059	STRENGTH OF EXISTING MASONRY WALLS	6.0329
STANDARDS FOR PLANNING WATER AND LAND RESOURCES	6.0223	STRESS-STRAIN RELATIONSHIPS OF REINFORCING BARS SUBJECTED TO LARGE STRAIN REVERSALS	3.0189
STARKWEATHER WATERSHED, NORTH DAKOTA	6.0204	STRESS-STRAIN-TIME BEHAVIOR OF SOIL AND ROCK UNDER TRIAXIAL CONDITIONS	3.0205
STATE-OF-THE-ART FOR ASSESSING EARTHQUAKE HAZARDS IN THE UNITED STATES. REPORT I	3.0233	STRUCTURAL EFFECTS OF THE FAIRBANKS, ALASKA EARTHQUAKE OF JUNE 21, 1967	9.0012
STATEN ISLAND BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, STATEN ISLAND, NEW YORK	15.0009	STRUCTURAL MODEL TESTS OF EARTHQUAKE EFFECTS (ES 047)	3.0018
STATEWIDE FLOOD-FREQUENCY REPORT - OKLAHOMA	6.0139	STUDIES IN CONNECTION WITH HYDROLOGIC AND RELATED PHYSICAL PROCESSES IN THE OLYMPUS COVE AREA OF SALT LAKE COUNTY	3.0065
STATIC AND EARTHQUAKE ANALYSIS OF THREE-DIMENSIONAL FRAME AND SHEAR WALL BUILDINGS	3.0099	STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX B	6.0031
STATISTICAL PREDICTION OF HURRICANE STORM SURGE - SOME MATHEMATICAL CONCEPTS RELATED TO STOCHASTIC SPECTRUM ANALYSIS (ABBREV)	8.0070	STUDIES IN SEISMICITY AND EARTHQUAKE DAMAGE STATISTICS, APPENDIX A	3.0024
		STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS - VOLUME IV - MODELS FOR MANAGING METROPOLITAN SURFACE WATER SYSTEMS	3.0002
			6.0335

STUDIES OF CUMULUS HEATING AND THE CFK MECHANISM.....	8.0067	SYNTHESIZING A PROCEDURE FOR FORMULATING URBAN FLOOD CONTROL PROGRAMS.....	6.
STUDIES OF GROUND MOTIONS IN LOCAL EARTHQUAKES.....	3.0028	SYSTEMS ANALYSIS OF EMERGENCY CARE DELIVERY.....	16.
STUDIES OF HAIL DATA IN 1970-72 - ILLINOIS.....	7.0008	TECHNIQUE FOR PROJECTING ALTERNATIVE FUTURES FOR WATER RESOURCE PLANNING.....	6.
STUDIES OF IMAGES OF SHORT-LIVED EVENTS USING ERTS DATA - ALASKA.....	5.0013	TECHNIQUES FOR RETROFITTING EXISTING BRIDGE STRUCTURES TO REDUCE THE SUSCEPTIBILITY TO EARTHQUAKE DAMAGE.....	3.
STUDIES OF THE RED ALGAE IN BISCAYNE BAY.....	6.0070	TECHNIQUES OF FLOOD-PLAIN MAPPING FOR LAND-USE MANAGEMENT OF FLOOD PLAINS.....	6.
STUDIES OF URBAN EFFECTS ON RAINFALL AND SEVERE WEATHER.....	2.0004	TECTONIC ANALYSIS OF SEISMICALLY ACTIVE ZONES IN NEVADA, IN SUPPORT OF EARTHQUAKE CONTROL. EXPERIMENT - CALIFORNIA, NEVADA, UTAH.....	3.
STUDIES ON THE FLUVIAL ENVIRONMENT, ARCTIC COASTAL PLAIN PROVINCE, NORTHERN ALASKA VOLUME I.....	10.0025	TECTONIC HISTORY - NORTH PACIFIC CONTINENTAL MARGIN - ALASKA.....	3.
STUDY OF FLOOD HYDROGRAPHS FOR SMALL DRAINAGE BASINS IN WYOMING.....	6.0415	TECTONIC STRESS IN THE EASTERN U.S. BY SEISMIC METHODS.....	3.
STUDY OF GROUND SHOCK INDUCED LIQUEFACTION AS A MECHANISM FOR FAILURE OF MILITARY INSTALLATIONS.....	10.0010	TECTONICS OF ACTIVE FAULTS - CALIFORNIA AND NEVADA.....	3.
STUDY OF GUIDELINES FOR LAND MANAGEMENT AND USE OF FLOOD- PRONE AREAS IN ALABAMA.....	6.0157	TEST OF THE ERTS-DATA COLLECTION SYSTEM IN THE SUSQUEHANNA RIVER BASIN.....	6.
STUDY OF MECHANISM OF ACCUMULATION AND RELEASE OF TECTONIC STRESS IN CENTRAL CALIFORNIA.....	3.0138	TETON DAM SEISMICITY - IDAHO.....	3.
STUDY OF SEAWATER DESALTING AS EMERGENCY WATER SUPPLY FOR NEW YORK CITY.....	2.0001	TEXAS BARRIER ISLANDS.....	15.
STUDY OF THE FEATURES AND ENERGY BUDGETS OF NORTHEASTERN COLORADO HAILSTORMS - ALSO, WISCONSIN.....	7.0018	TEXAS COAST HURRICANE SURGE MODEL STUDIES.....	8.
STUDY OF THE SYNOPTIC CLIMATOLOGY OF NORTH AMERICA.....	12.0034	THE CHARLOTTE CONSORTIUM TASK I REPORT - VOLUME IIA - ANALYSIS OF MUNICIPAL ACTIVITIES - PUBLIC SAFETY SUBSYSTEM.....	16.
STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS - ILLINOIS.....	12.0032	THE DECISION PROCESS IN HURRICANE FORECASTING.....	8.
SUBAUDIBLE ROCK NOISE (SARN) AS A MEASURE OF SLOPE STABILITY, CALIFORNIA.....	9.0006	THE DETECTION OF CENTERS OF COMBUSTION OF SMALL DIMENSIONS BY THE METHOD FOR IR PHOTOGRAPHY.....	5.
SUBSIDENCE AND RELATED ASPECTS OF GEOTHERMAL SYSTEMS.....	10.0017	THE DETERMINATION OF THE FREQUENCY OF DROUGHT FLOWS OF VARYING DEGREES OF SEVERITY AND DURATION - NEW JERSEY.....	2.
SUBSIDENCE INVESTIGATIONS ON ORGANIC SOILS.....	10.0028	THE DEVELOPMENT OF A MEANS FOR ASSESSING EMERGENCY MEDICAL RESOURCES.....	16.
SUMMARY OF METHODOLOGY AND PILOT APPLICATION.....	3.0064	THE EFFECT OF GEOLOGIC STRUCTURE ON THE OCCURRENCE OF FRESH GROUND WATER IN POST-OLIGOCENE DEPOSITS OF THE GULF COASTAL PLAIN.....	3.
SUMMARY OF SELECTED REFERENCE MATERIAL ON THE OCEANOGRAPHIC PHENOMENA OF TIDES, STORM SURGES, WAVES, AND BREAKERS.....	8.0114	THE EFFECT OF GROUND-WATER CONDITIONS ON LOCAL FLOODING IN THE KINGSTON AREA, PENNSYLVANIA.....	6.
SUMMARY OF 1969 AND 1970 PUBLIC SEVERE THUNDERSTORM AND TORNADO WATCHES WITHIN THE NATIONAL WEATHER SERVICE, EASTERN REGION.....	12.0020	THE EFFECT OF URBANIZATION ON HYDROLOGY OF WATERSHEDS - INDIANA..	6.
SUMMARY REPORT - WEATHER MODIFICATION - FISCAL YEARS 1969, 1970, 1971.....	16.0045	THE EFFECT OF YIELD STRENGTH AND DUCTILITY TO FATIGUE DAMAGE.....	3.
SURFICIAL GEOLOGY OF JUNEAU AND VICINITY URBAN AREA, ALASKA.....	1.0010	THE EFFECTIVENESS OF FLOOD CONTROL. STRUCTURE OF THE LOWER MINNESOTA	
SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969.....	8.0014		

THE EFFECTS OF LAND USE CHANGE ON THE HYDROLOGY OF AN URBAN WATERSHED.....	6.0242	THE RELATION BETWEEN FELT AREA AND MAGNITUDE FOR CENTRAL UNITED STATES EARTHQUAKES.....	3.0238
THE FAIRBANKS, ALASKA, EARTHQUAKES OF JUNE 21, 1967.....	3.0221	THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL CARE SYSTEMS.....	16.0024
THE FEDERAL RESPONSE TO TROPICAL STORM AGNES, A REPORT TO THE SENATE COMMITTEE ON PUBLIC WORKS, SUBCOMMITTEE ON DISASTER RELIEF.....	8.0001	THE SALVATION ARMY - ITS STRUCTURE, OPERATIONS, AND PROBLEMS IN DISASTERS.....	16.0017
THE FLOOD PLAIN AS A RESIDENTIAL CHOICE - RESIDENT ATTITUDES AND PERCEPTIONS AND THEIR IMPLICATIONS TO FLOOD PLAIN MANAGEMENT POLICY.....	6.0239	THE SAN FERNANDO EARTHQUAKE OF FEBRUARY 9, 1971 AND PUBLIC POLICY.....	3.0151
THE FORMULATION AND EXPERIMENTAL VERIFICATION OF MATHEMATICAL MODELS FOR PREDICTING DYNAMIC RESPONSE OF MULTISTORY BUILDINGS.....	3.0061	THE SAN FERNANDO EARTHQUAKE SOILS AND GEOLOGIC INVESTIGATIONS IN RELATION TO HIGHWAY DAMAGE.....	3.0012
THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES.....	6.0019	THE SANTA ROSA, CALIFORNIA, EARTHQUAKES OF OCTOBER 1, 1969.....	3.0025
THE GREAT OAKLAND, LOS ANGELES, AND SAN DIEGO FIRES, SEPTEMBER 22 TO 29, 1970.....	5.0012	THE SEISMIC RISK MAP OF THE UNITED STATES - DEVELOPMENT, USE, AND PLANS FOR FUTURE REFINEMENT.....	3.0160
THE HOMEPORT STORY - AN IMAGINARY CITY GETS READY FOR A HURRICANE.....	8.0023	THE SEISMIC SAFETY STUDY FOR THE GENERAL PLAN.....	3.0149
THE HUMAN ECOLOGICAL IMPACT OF STRUCTURAL FLOOD CONTROL ON THE IOWA RIVER, IOWA.....	6.0273	THE STRUCTURE AND DYNAMICS OF THE HURRICANE'S INNER CORE REGION.....	8.0069
THE IMPACT OF URBANIZATION ON WATER YIELD, FLOOD PEAK, SEDIMENT YIELD, AND WATER QUALITY IN THE BERKELEY HILLS, CALIFORNIA.....	6.0166	THE UNPREDICTABLE DISASTER IN A METROPOLIS - PUBLIC RESPONSE TO THE LOS ANGELES EARTHQUAKE OF FEBRUARY, 1971.....	3.0074
THE IMPLICATIONS OF THE NET FISCAL BENEFITS CRITERION FOR COST SHARING IN FLOOD CONTROL PROJECTS.....	6.0101	THE USE OF DETAILED SOILS INFORMATION FOR DELINEATING AND REGULATING FLOOD PLAINS - LEGAL AND ADMINISTRATIVE CONSIDERATIONS.....	6.0413
THE INFLUENCE OF CLAY MINERALS ON SURFICIAL EARTH MOVEMENTS.....	9.0056	THE USE OF GRASSES FOR DUNE STABILIZATION ALONG THE GULF COAST WITH INITIAL EMPHASIS ON THE TEXAS COAST.....	8.0049
THE INFLUENCE OF WEATHER AND CLIMATE ON FOREST FIRE OCCURRENCE AND BEHAVIOR IN THE EAST AND SOUTH.....	5.0043	THE USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - VOLUME I.....	6.0328
THE INVESTIGATION OF SHELTER MANAGEMENT AND CONTROL IN NATURAL DISASTER.....	16.0079	THE WARNING SYSTEM IN DISASTER SITUATIONS - A SELECTIVE ANALYSIS.....	16.0099
THE MAJOR TSUNAMI IN THE HAWAIIAN ISLANDS.....	13.0025	THE WICHITA FALLS CONSORTIUM PHASE I REPORT - VOLUME III - ANALYSIS OF MUNICIPAL ACTIVITIES - SECTION IV - PUBLIC SAFETY SUBSYSTEM.....	16.0103
THE METEOROLOGICAL AND HYDROLOGICAL ASPECTS OF THE MAY 1968 NEW JERSEY FLOODS.....	6.0022	THEORETICAL ANALYSIS OF LARGE-SCALE TROPICAL DISTURBANCES.....	8.0099
THE MODIFICATION OF GREAT LAKES WINTER STORMS.....	11.0003	THEORETICS IN DESIGN OF THE PROPOSED CRESCENT CITY HARBOR TSUNAMI MODEL.....	13.0026
THE NATIONAL HAIL RESEARCH EXPERIMENT SUMMER 1973 SUMMARY REPORT.....	7.0011	THERMAL SURVEILLANCE OF ACTIVE VOLCANOES.....	1.0609
THE NATURE AND EXTENT OF STRUCTURAL DAMAGE CAUSED BY HURRICANE CAMILLE.....	8.0007	THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM - WASHINGTON, OREGON AND CALIFORNIA.....	14.0008
THE OCHELTREE TORNADO - A CASE STUDY - MISSOURI.....	12.0003	THREE DIMENSIONAL STOCHASTIC MODELLING OF STRONG EARTHQUAKE GROUND MOTIONS.....	3.0087
THE PEACHTREE CREEK WATERSHED AS A CASE HISTORY IN URBAN FLOOD PLAIN DEVELOPMENT.....	6.0240	THREE-YEAR OPERATION OF THE UNIVERSITIES COUNCIL FOR EARTHQUAKE ENGINEERING RESEARCH.....	3.0143
THE POLICE DEPARTMENT IN NATURAL			

TORNADOES IN TENNESSEE (1790-1970) WITH REFERENCE TO NOTABLE TORNADO DISASTER IN THE UNITED STATES (1880- 1970).....	12.0009	URBAN HYDROLOGY AND URBAN WATER RESOURCES OF THE ISLAND OF OAHU, HAWAII.....	6.0076
TOWARD REDUCTION OF LOSSES FROM EARTHQUAKES.....	3.0186	URBAN HYDROLOGY OF POWAY VALLEY, CALIFORNIA.....	6.0169
TRACER STUDIES IN THE NATIONAL HAIL RESEARCH EXPERIMENT (NHRE).....	7.0017	URBAN HYDROLOGY OF STREAMS IN FAIRFAX COUNTY.....	6.0400
TRAINING AND EVALUATION OF MENTAL HEALTH SERVICES TO RESIDENTS OF FLOOD DISASTER AREAS IN COMMONWEALTH OF PENNSYLVANIA.....	6.0010	URBAN HYDROLOGY STUDIES OF SELECTED AREAS IN TEXAS - DALLAS, AUSTIN.....	6.0373
TRAINING PROGRAM FOR CRISIS INTERVENORS.....	16.0020	URBAN HYDROLOGY STUDY - AUSTIN, TEXAS.....	6.0372
TRANS-ALASKA PIPELINE - SUPPLEMENTAL EXHIBITS AND TESTIMONY - VOLUME V.....	13.0006	URBAN HYDROLOGY STUDY - DALLAS COUNTY, TEXAS.....	6.0384
TRAVEL TIME OF GEORGIA STREAMS.....	6.0241	URBAN HYDROLOGY STUDY - FORT WORTH, TEXAS.....	6.0383
TRAVEL-TIME TABLES FOR EARTHQUAKES IN THE CENTRAL UNITED STATES.....	3.0239	URBAN HYDROLOGY STUDY - HOUSTON, TEXAS.....	6.0386
TREE-RING DATING & SPATIAL ANALYSIS OF LONG-TERM SLOPE MOVEMENTS - UTAH.....	9.0055	URBAN HYDROLOGY STUDY - SAN ANTONIO, TEXAS.....	6.0377
TROPICAL CYCLONE ENERGY TRANSFER.....	8.0054	URBAN HYDROLOGY STUDY, DALLAS, TEXAS.....	6.0382
TROPICAL CYCLONE MOVEMENT FORECASTS BASED ON OBSERVATIONS FROM SATELLITES.....	8.0053	URBAN HYDROLOGY STUDY, SAN ANTONIO, TEXAS.....	6.0389
TROPICAL CYCLONES.....	8.0055	URBAN RUNOFF.....	6.0339
TROPICAL METEOROLOGIC PROBLEMS.....	8.0058	URBAN SYSTEMS - STORM DRAINAGE & FLOOD PLAIN MANAGEMENT, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT (ABBREV).....	6.0307
TROPICAL STORM SURGE FORECASTING.....	8.0109	URBAN SYSTEMS - WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE & FLOOD PLAIN MANAGEMENT (ABBREV).....	6.0308
TSUNAMI PREDICTIONS FOR PACIFIC COASTAL COMMUNITIES - TYPE 16 FLOOD INSURANCE STUDY.....	13.0028	USE OF ERTS-1 DATA - SUMMARY REPORT OF WORK ON TEN TASKS.....	6.0298
TSUNAMI RESEARCH.....	13.0004	USE OF MULTISPECTRAL PHOTOGRAPHY IN WATER RESOURCE PLANNING AND MANAGEMENT IN NORTH CAROLINA.....	6.0137
TSUNAMI RESEARCH.....	13.0005	USE OF SATELLITE DATA IN STUDIES OF TROPICAL DISTURBANCES.....	8.0098
TSUNAMI RESEARCH AND ENGINEERING APPLICATIONS.....	13.0015	USE OF SYSTEMS ANALYSIS IN THE DEVELOPMENT OF WATER RESOURCES MANAGEMENT PLANS FOR NEW YORK STATE - ADDENDUM.....	6.0131
TSUNAMI SHORELINE TRACT.....	13.0024	V. A. HOSPITAL SITE EVALUATIONS.....	3.0177
TSUNAMI SYSTEMS ENGINEERING - NEW MEXICO AND CALIFORNIA.....	13.0011	VA. SEISMICITY - 32 STATES AND PUERTO RICO.....	3.0165
TSUNAMI TRAVEL-TIME CHARTS FOR USE IN THE TSUNAMI WARNING SYSTEM REVISED 1971 EDITION.....	13.0008	VAN NORMAN RESERVOIRS AREA, CALIFORNIA.....	3.0006
UNION CREEK WATERSHED PROJECT, SOUTH DAKOTA.....	6.0196	VARIATION OF URBAN RUNOFF WITH DURATION AND INTENSITY OF STORMS - TEXAS.....	6.0387
UNIVERSITY-INDUSTRY WORKSHOP ON HAZARDS AND DAMAGE RELATED TO EXPANSIVE EARTH MATERIALS.....	4.0008	VERDE LANE FLOOD PREVENTION PROJECT MEASURE, NEBRASKA.....	6.0205
UPPER MISSISSIPPI RIVER COMPREHENSIVE BASIN STUDY - VOLUME V, APPENDIX I - FLOOD CONTROL.....	6.0017	VERIFICATION OF EMPIRICAL METHOD OF DETERMINING RIVERBANK STABILITY (POTAMOLGY INVESTIGATIONS - SOILS PHASE).....	10.0030
URBAN FLOOD HYDROLOGY OF STREAMS IN FAIRFAX COUNTY, VIRGINIA.....	6.0401	VIRGINIA BEACH, VIRGINIA - BEACH EROSION CONTROL AND HURRICANE PROTECTION.....	15.0011
URBAN GEOLOGY - PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, AND COSTS OF GEOLOGIC HAZARDS AND RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).....	16.0025	VISUAL, IR, AND DATA COLLECTION CAPABILITIES OF THE GOES SATELLITE.....	8.0108
URBAN GEOLOGY PLAN FOR CALIFORNIA - THE NATURE, MAGNITUDE, & COSTS OF GEOLOGIC HAZARDS & RECOMMENDATIONS FOR THEIR MITIGATION (ABBREV).....	16.0038		

RESOURCES PLANNING AND MANAGEMENT - THE PROCEEDINGS OF THE ANNUAL CONFERENCE HELD AT SAN ANTONIO (ABBREV).....	6.0379	DAKOTA.....	7.0
WATER RELATED ENVIRONMENTAL SERVICES.....	6.0133	WEATHER SATELLITE CAPABILITIES - PRESENT AND FUTURE.....	16.0
WATER RESOURCES INVESTIGATIONS.....	6.0216	WHITEWATER CREEK HYDROLOGIC UNIT PROJECT MEASURE, CHEROKEE HILLS RC AND D PROJECT, OKLAHOMA.....	6.0
WATER RESOURCES OF MIDDLE GEORGIA.....	6.0245	WIND AND SURGE DAMAGE DUE TO HURRICANE CAMILLE.....	8.0
WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA.....	6.0303	WIND-INDUCED MOTION AND HUMAN DISCOMFORT IN TALL BUILDINGS.....	12.0
WATER RESOURCES POLICY IN WISCONSIN - VOLUME IV - FLOOD PLAIN MANAGEMENT.....	6.0410	WORTH OF HYDROLOGIC DATA FOR SHORT- TERM FORECASTS OF FLOODS.....	6.0
WATER WARNINGS AND SPECIALIZED FORECASTS.....	6.0081	XENIA REBUILDS.....	12.0
WATER YIELD IMPROVEMENT AND AVALANCHE HAZARD PREDICTION IN ALPINE AREAS OF THE ROCKY MOUNTAINS.....	1.0011	ZONING ORDINANCE - KNOX COUNTY, INDIANA.....	6.0
WAVE AND SURGE ACTION, MONTEREY HARBOR, MONTEREY, CALIFORNIA - MODEL INVESTIGATION.....	8.0042	ZONING ORDINANCE - PAINTSVILLE, KENTUCKY.....	6.0
WAVE AND SURGE CONDITIONS AFTER PROPOSED EXPANSION OF MONTEREY		ZONING ORDINANCE AND ORDER, PIKE COUNTY, ELKHORN CITY, KENTUCKY.....	6.0
		ZONING ORDINANCE AND SUBDIVISION REGULATIONS, FRIARS POINT, MISSISSIPPI.....	6.0
		ZONING ORDINANCE, HUNTINGDON, TENNESSEE.....	6.0
		ZONING REGULATIONS OF THE CITY OF SARASOTA, FLORIDA.....	6.0



# SELECTED BIBLIOGRAPHY OF PUBLICATIONS ON NATURAL HAZARDS

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## Contents

	Page
.....	1
.....	8
.....	10
.....	11
.....	12
.....	16
.....	19
.....	19
.....	20
.....	23
.....	24
.....	24
.....	25
.....	27
.....	27
.....	28

## GENERAL

## American Meteorological Society

- 1973 "Policy Statement of the American Meteorological Society on Purposeful and Inadvertent Modification of Weather and Climate." *Bulletin of the American Meteorological Society* 54, pp. 694-695.

## Anderson, Jon W.

- 1968 "Cultural Adaptation to Threatened Disaster." *Human Organization* 27, pp. 298-307.

## Anderson, William A.

- 1969 "Disaster Warning and Communication Processes in Two Communities." *Journal of Communication* 19 (June), pp. 92-104.
- 1970 "Military Organizations in Natural Disaster: Established and Emergent Norms." *American Behavioral Scientist* 13, pp. 415-422.

## Assessment of Research on Natural Hazards

- 1973 *Bibliography of Published Works on Natural Hazards Contributing to Social Scientific Knowledge*. Boulder: University of Colorado Institute of Behavioral Science.

## Ayre, Robert S.

- 1975 *Technological Adjustments to Natural Hazards*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

## Baddeley, A. D.

- 1972 "Selective Attention and Performance in Dangerous Environments." *British Journal of Psychology* 63, pp. 537-546.

## Baker, Earl J. and Joe Gordon-Feldman McPhee

- 1975 *Land Use Management and Regulation in Hazardous Areas: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

## Baker, George W.

- 1964 "Comments on the Present Status and the Future Direction of Disaster Research." Pages 315-330 in George H. Grosser, Henry Wechsler and Milton Greenblatt (eds.) *The Threat of Impending Disaster: Contributions to the Psychology of Stress*. Cambridge, Massachusetts: The M.I.T. Press.

## Baldwin, John L.

- 1973 *Climates of the United States*. National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Washington: U.S. Government Printing Office.

## Barton, Allen H.

- 1970 *Communities in Disaster: A Sociological Analysis of Collective Stress Situations*. New York: Anchor Books.

## Battelle-Columbus Laboratories

- 1973 *Science, Technology, and Innovation*. Prepared for the National Science Foundation. Columbus, Ohio.

## Bosselman, Fred and David Callies

- 1971 *The Quiet Revolution in Land Use Control*. Council on Environmental Quality. Washington: U.S. Government Printing Office.

## Brouillette, John R. and E. L. Quarantelli

- 1971 "Types of Patterned Variation in Bureaucratic Adaptations to Organizational Stress." *Sociological Quarterly* 41 (Winter), pp. 39-46.

## Burton, Ian and Robert W. Kates

- 1964 "The Perception of Natural Hazards in Resource Management." *Natural Resources Journal* 3, pp. 412-441.

## Burton, Ian, Robert W. Kates and Gilbert F. White

- 1968 *The Human Ecology of Extreme Geophysical Events*. Natural Hazards Research Working Paper #1. Toronto: University of Toronto Department of Geography.

- 1975 *The Environment as Hazard*. New York: Oxford University Press (forthcoming).

## California Disaster Office

- 1969 *Guidance for the Development of a County Emergency Plan*. Sacramento: California Community Emergency Planning Program.

## Carr, William H. A.

- 1967 *Perils Named and Unnamed: The Story of the Insurance Company of North America*. New York: McGraw-Hill.

on, Anita L.

*A Selected, Annotated Bibliography on Natural Hazards.* Natural Hazard Research Working Paper #22. Boulder: University of Colorado Institute of Behavioral Science.

ne, Harold C.

*Natural Hazards and Their Distributional Effects.* Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

Committee on Public Engineering Policy

*Priorities in Applied Research: An Initial Appraisal.* Washington: National Academy of Engineering.

*Perspectives on Benefit-Risk Decision Making.* Washington: National Academy of Engineering.

*Priorities for Research Applicable to National Needs.* Panel of Natural Hazards. Washington: National Academy of Engineering.

Comptroller General of the United States

*Information on Federal Disaster Relief Programs.* Washington: General Accounting Office.

Congressional Research Service

*After Disaster Strikes: Federal Programs and Organizations.* A Report to the Committee on Government Operations by the Congressional Research Service of the Library of Congress. July. Washington: U.S. Government Printing Office.

er, Nicholas H. and Asit K. Biswas

*Evaluation of Environmental Intangibles.* Bronxville, New York: General Press.

eld, H. J.

*General Climatology.* Englewood Cliffs, New Jersey: Prentice-Hall.

Douglas C. and Howard Kunreuther

*The Economics of Natural Disasters: Implications for Federal Policy.* New York: The Free Press.

Elliott R., Paul W. Thayer and Lila R. Glanter

*The Effects of a Threatening Rumor on a Disaster Stricken Community.* National

Delafons, John

1969 *Land-use Controls in the United States.* Cambridge, Massachusetts: M.I.T. Press.

Diggory, James C.

1956 "Some Consequences of Proximity to a Disaster Threat." *Sociometry* 19, pp. 47-53.

Disaster Research Group

1961 *Field Studies of Disaster Behavior: An Inventory.* National Academy of Sciences, National Research Council Disaster Study #14. Washington: National Academy of Sciences.

Drabek, Thomas E.

1965 *Laboratory Simulation of a Police Communication System Under Stress.* Ph.D. Dissertation. Departments of Sociology and Anthropology. Columbus: The Ohio State University.

1968 *Disaster in Aisle 13: A Case Study of the Coliseum Explosion, October 31, 1963.* Disaster Research Center Series, College of Administrative Science Monograph #D1. Columbus: The Ohio State University.

1969 "Social Processes in Disaster: Family Evacuation." *Social Problems* 16, pp. 336-349.

Drabek, Thomas E., et al.

1973 *Longitudinal Impact of Disaster on Family Functioning.* Final Progress Report to the National Institute of Mental Health. Denver: University of Denver Department of Sociology.

Dynes, Russell R.

1970 *Organized Behavior in Disaster.* Lexington, Massachusetts: D.C. Heath.

Dynes, Russell R., et al.

1972 *A Perspective on Disaster Planning.* Disaster Research Center Report Series #11. Columbus: The Ohio State University.

Environmental Science Services Administration

1968 *The Climatic Atlas of the United States.* Research Laboratories Technical Manual. U.S. Department of Commerce. Washington: U.S. Government Printing Office.

Ericksen, Neil J.

1975 *Scenario Methodology in Natural Hazards*

Modification." *Bulletin of the American Meteorological Society* 55, pp. 759-764.

Form, William H. and Charles P. Loomis

- 1956 "The Persistence and Emergence of Social and Cultural Systems in Disasters." *American Sociological Review* 21, pp. 180-185.

Friedman, D. G.

- 1972 "Insurance and the Natural Hazards." *International Journal of Actuarial Studies in Non-Life Insurance and Risk Theory* 7 (part 1), pp. 4-58. Amsterdam, The Netherlands.

- 1973 "Computer Simulation of Natural Hazard Effects." Hartford, Connecticut: The Travelers Insurance Company.

- 1973 "Prospective View of Natural Disasters in The United States." Paper presented at the First International Symposium of the System Safety Society on Safety and the Consumer. Denver, Colorado.

- 1973 *Computer Simulation of the Natural Hazard Catastrophe Potential*. Hartford, Connecticut: The Travelers Insurance Company.

- 1975 *Computer Simulation in Natural Hazard Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

Friedsam, H. J.

- 1961 "Reactions of Older Persons to Disaster-Caused Losses: An Hypothesis of Relative Deprivation." *Gerontologist* 1, pp. 34-37.

Fritz, Charles

- 1961 "Disaster." In R. K. Merton and R. A. Nisbet (editors) *Contemporary Social Problems*. New York: Harcourt.

Fritz, Charles E. and J. H. Mathewson

- 1957 *Convergent Behavior in Disasters*. National Research Council Disaster Study #9. Washington: National Academy of Sciences.

Glaser, Edward M. and Samuel H. Taylor

- 1973 "Factors Influencing the Success of Applied Research." *American Psychologist* 28 (February), pp. 140-146.

*Psychological Aspects of Stress*. Springfield, Illinois: Charles C. Thomas.

Golant, Stephen

- 1969 *Human Behavior Before the Disaster: A Selected Annotated Bibliography*. Natural Hazards Research Working Paper No. 9. Toronto: University of Toronto.

Grosser, George H., et al.

- 1964 *The Threat of Impending Disaster: Contributions to the Psychology of Stress*. Cambridge, Massachusetts: M.I.T. Press.

Haas, J. Eugene

- 1973 "Social Aspects of Weather Modification." *Bulletin of the American Meteorological Society* 54, pp. 647-657.

- 1974 "Sociological Aspects of Weather Modification." Pages 787-811 in Wilmot N. Hess (editor) *Weather and Climate Modification*. New York: Wiley.

Haas, J. Eugene and Thomas E. Drabek

- 1970 "Community Disaster and Systems Stress: A Sociological Perspective." Pages 264-286 in Joseph McGrath (editor) *Social and Psychological Factors in Stress*. New York: Holt, Rinehart and Winston.

- 1973 *Complex Organizations: A Sociological Perspective*. New York: Macmillan.

Harbridge House, Inc.

- 1972 *An Inquiry into the Long-term Economic Impact of Natural Disasters in the United States*. Prepared for Office of Technical Assistance, Economic Development Administration, U.S. Department of Commerce. Boston: Harbridge House, Inc.

Haveman, R. H. and Julius Margolis (editors)

- 1970 *Public Expenditures and Policy Analysis*. Chicago: Markham.

Hewitt, Kenneth and Ian Burton

- 1971 *The Hazardousness of a Place*. University of Toronto Department of Geography Research Publication #6. Toronto: University of Toronto Press.

Higbee, K. L. and T. Lafferty

- 1972 "Relationship Among Risk Preferences, Importance, and Control" *Journal of Psychology* 81, pp. 249-251.

**J. H. Wiggins Company**

- 1973 *Risk Acceptance and Public Policy*. Proceedings of Session IV, International Systems Safety Society Symposium, Denver, Colorado, July 17-20, 1973. Redondo Beach, California: J. H. Wiggins Company.

**Jackson, O. N., L. Hourany, and N. J. Vidmar**

- 1972 "A Four-Dimensional Interpretation of Risk-Taking." *Journal of Personality* 40, pp. 483-501.

**Janis, Irving I. and Seymour Feshbach**

- 1953 "Effects of Fear-Arousing Communications." *Journal of Abnormal Social Psychology* 48, pp. 78-92.

**Jones, D. Earl, Jr. and Wesley Holtz**

- 1973 "Expansive Soils --- The Hidden Disaster." *Civil Engineering* 43, pp. 49-51.

**Kaplan, M.**

- 1971-72 "Actuarial Aspects of Flood and Earthquake Insurance." Pages 474-511 in *Proceedings of the Conference of Actuaries in Public Practice* Volume 21. Chicago: Association of Actuaries in Public Practice.

**Kaplan, Stephen**

- 1972 "The Challenge of Environmental Psychology: A Proposal for a New Functionalism." *American Psychologist* 27, pp. 140-143.

**Kates, Robert W.**

- 1971 "Natural Hazard in Human Ecological Perspective: Hypotheses and Models." *Economic Geography* 47, pp. 438-451.

**Kennedy, Will C.**

- 1970 "Police Departments: Organization and Tasks in Disaster." *American Behavioral Scientist* 13, pp. 354-361.

**Koppelman, Lee E.**

- 1974 *A Methodology to Achieve the Integration of Coastal Zone Science and Regional Planning*. Report prepared for the Office of Policy Development and Research, Department of Housing and Urban Development.

**Kunreuther, Howard**

- 1973 *Recovery from Natural Disasters*. Washington: American Enterprise Institute for Public Policy Research.
- 1973 "Values and Costs." In *Building Practices for Disaster Mitigation, Proceedings of a Workshop*. National Bureau of Standards, Building Science Series #46. U.S. Department of Commerce. Washington: U.S. Government Printing Office.

**Lee, Robert R., Gerald A. Fleischer and Vincent J. Roggeveen**

- 1961 *Engineering-Economic Planning of Water Resources: A Selected Bibliography*. Stanford: Stanford University Project on Engineering-Economic Planning.

**McGuire, William J.**

- 1968 "The Nature of Attitudes and Attitude Change." In Gardner Linzey and Elliot Aronson, editors, *Handbook of Social Psychology*, second edition, Volume 3. Reading, Massachusetts: Addison Wesley.

**McLuckie, Benjamin F.**

- 1970 *A Study of Functional Response to Stress in Three Societies*. Doctoral Thesis. Columbus, Ohio: The Ohio State University Departments of Sociology and Anthropology.
- 1970 *The Warning System in Disaster Situations: A Selective Analysis*. Research Report #9. Columbus, Ohio: The Ohio State University Disaster Research Center.

**Mack, Raymond W. and George W. Baker**

- 1961 *The Occasion Instant*. Disaster Study #15. National Academy of Sciences, National Research Council. Washington.

**Mangen, George F. and Herbert A. Swenson**

- 1972 *Urban Water Planning: A Bibliography*. Water Resources Scientific Information Center, Office of Water Resources Research. Washington: U.S. Department of the Interior.

**Manning, Diana**

- 1973 *Disaster Technology: An Annotated Bibliography*. London Technical Group. London: Kensington Press.

**Mileti, Dennis S.**

- 1975 *Disaster Relief and Rehabilitation in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).
- 1975 *Natural Hazard Warning Systems in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Mileti, Dennis S., Thomas Drabek and J. Eugene Haas**

- 1975 *Human Systems in Extreme Environments: A Sociological Perspective*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Miller, L. C., et al.**

- 1972 "Factor Structure of Childhood Fears." *Journal of Consulting and Clinical Psychology* 39, pp. 264-268.

**National Academy of Sciences**

- 1971 *The Atmospheric Sciences and Man's Needs: Priorities for the Future*. National Research Council Committee on Atmospheric Sciences. Washington: National Academy of Sciences.

**National Bureau of Standards**

- 1973 *Building Practices for Disaster Mitigation*. Edited by Richard Wright, Samuel Kramer and Charles Culver. National Bureau of Standards Building Science Series #46. Washington: U.S. Government Printing Office.

1959- *Storm Data* (Monthly). Asheville, North Carolina: Environmental Data Service.

1973 *Operations of the National Weather Service*. Silver Spring, Maryland: U.S. Department of Commerce.

1973 *A Federal Plan for Natural Disaster Warning and Preparedness*. Federal Committee for Meteorological Services and Supporting Research. Washington: U.S. Department of Commerce.

**National Science Board**

- 1971 *Environmental Science: Challenge for the Seventies*. Washington.

**National Science Foundation**

- 1966 *Weather and Climate Modification: Report of the Special Commission on Weather Modification*. Washington.

**National Water Commission**

- 1973 *Water Policies for the Future*. Washington: U.S. Government Printing Office.

**Nichols, D. R. and C. C. Campbell (editors)**

- 1969 *Environmental Planning and Geology*. Proceedings of the Symposium on Engineering Geology in the Urban Environment, San Francisco, October, 1969. Washington: U.S. Government Printing Office.

**Nisan, M. and A. Minkowich**

- 1973 "The Effect of Expected Temporal Distance on Risk Taking." *Journal of Personality and Social Psychology* 25, pp. 375-380.

**Office of Emergency Preparedness**

- 1972 *Disaster Preparedness*, Volumes 1, 2, and 3. Executive Office of the President. Washington: U.S. Government Printing Office.

**Perry, Helen Swick and Stewart E. Perry**

- 1959 *The Schoolhouse Disasters*. National Academy of Sciences, National Research Council Disaster Study #11. Washington: National Academy of Sciences.

**Pollatsek, A. and A. Tversky**

- 1970 "A Theory of Risk." *Journal of Mathematical Psychology* 7, pp. 540-553.

**Quarantelli, Enrico L. (Continued)**

- 1957 "The Behavior of Panic Participants." *Sociology and Social Research* 41, pp. 187-194.
- 1960 "Images of Withdrawal Behavior in Disasters: Some Basic Misconceptions." *Social Problems* 8, pp. 68-79.
- 1970 "A Selected Annotated Bibliography of Social Science Studies on Disasters." *American Behavioral Scientist* 13, pp. 452-456.
- 1970 "The Community General Hospital: Its Immediate Problems in Disaster." *American Behavioral Scientist* 13, pp. 380-391.

**Quarantelli, Enrico L. and Russell R. Dynes**

- 1970 "Property Norms and Looting: Their Patterns in Community Crisis." *Phylon* 31, (Summer), pp. 168-182.

**Raker, J. W., et al.**

- 1956 *Emergency Medical Care in Disasters: A Summary of Recorded Experience*. National Academy of Sciences, National Research Council Disaster Study #6. Washington: National Academy of Sciences.

**Rayner, Jeanette**

- 1957 "Annotated Bibliography on Disaster Research." *Human Organization* 16 (Summer), pp. 30-40.

**Reilly, W. K.**

- 1973 *The Use of Land: A Citizen's Policy Guide to Urban Growth*. New York: Crowell.

**Rogers, E. M. and F. F. Shoemaker (editors)**

- 1971 *Communication of Innovations*. New York: The Free Press.

**Rogers, W. P., et al.**

- 1974 *Guidelines and Criteria for Identification and Land-Use Controls of Geologic Hazard and Mineral Resource Areas*. Colorado Geological Survey Department of Natural Resources Special Publication No. 6. Denver: State of Colorado.

**Rotter, J. B., M. Seeman, and S. Liverant**

- 1962 Internal versus External Control of Reinforcements: A Major Variable in Behavior Theory." In N. F. Washburne (editor) *Decisions, Values, and Groups* Volume 2. New York: Pergamon Press.

**Russell, Clifford S.**

- 1970 "Losses from Natural Hazards." *Land Economics* 46, pp. 383-393.

**Sather, H. N.**

- 1974 *Biostatistical Aspects of Risk-Benefit: The Use of Competing Risks Analysis*. Los Angeles: University of California School of Engineering and Applied Science.

**Sav, G. Thomas**

- 1974 *Natural Disasters: Some Empirical and Economic Considerations*. Center for Building Technology, Institute for Applied Technology, National Bureau of Standards. Washington: U.S. Department of Commerce.

**Sims, John and Thomas F. Saarinen**

- 1969 "Coping with Environmental Threat: Great Plains Farmers and the Sudden Storm." *Annals of the Association of American Geographers* 59, pp. 677-686.

**Slosson, J.**

- 1969 "The Role of Engineering Geology in Urban Planning." Pages 8-14 in *The Governor's Conference on Environmental Geology, April 30-May 2, 1969*. Sacramento, California.

**Slovic, Paul**

- 1964 "Assessment of Risk Taking Behavior." *Psychological Bulletin* 61, pp. 220-233.

**Smith, Courtland L. and Thomas C. Hogg**

- 1971 "Benefits and Beneficiaries: Contrasting Economic and Cultural Distinctions." *Water Resources Research* 8, pp. 254-263.

**Spence, H. E. and R. Moinpour**

- 1972 "Fear Appeals in Marketing: A Social Perspective." *Journal of Marketing* 36, pp. 39-43.

**Starr, Chauncey**

- 1969 "Social Benefit versus Technological Risk." *Science* 165, pp. 1232-1238.
- 1972 "Benefit-Cost Studies in Socio-technical Systems." Pages 17-42 in Committee on Public Engineering Policy *Perspectives on Benefit-Risk Decision Making*. Washington: National Academy of Engineering.

**Stoddard, Ellwyn R.**

- 1968 *Conceptual Models of Human Behavior in Disaster*. El Paso: Texas Western Press.

**Strumpfer, D. J.**

- 1970 "Fear and Affiliation During a Disaster." *Journal of Social Psychology* 82, pp. 263-268.

**Study of Man's Impact on Climate**

- 1971 *Inadvertent Climate Modification, Report of the Study of Man's Impact on Climate*. Cambridge, Massachusetts: The M.I.T. Press.

**U.S. Department of Agriculture**

- 1936- *Agricultural Statistics, Yearly Reports*. Washington: U.S. Government Printing Office.
- 1970 *Economic Considerations in Crop Insurance*. Economic Research Service Report #447. Washington: U.S. Government Printing Office.

**U.S. Department of Housing and Urban Development**

- 1970 *Environmental Planning and Geology*. Washington: U.S. Government Printing Office.

**U.S. Water Resources Council**

- 1968 *The Nation's Water Resources*. Washington: U.S. Government Printing Office.
- 1972 *OBERS Projections, Regional Economic Activity in the United States*. Washington: U.S. Water Resources Council.

**Wang, Jen Yu and Gerald L. Barger**

- 1962 *Bibliography of Agricultural Meteorology*. Madison: University of Wisconsin.

**Warheit, George Jay****Weisbecker, Leo W.**

- 1974 *Snowpack, Cloud-Seeding, and the Colorado River: A Technology Assessment of Weather Modification*. Norman: University of Oklahoma Press.

**White, Gilbert F. (editor)**

- 1974 *Natural Hazards: Local, National, Global*. New York: Oxford University Press.

**White, Gilbert F. and J. Eugene Haas**

- 1975 *Assessment of Research on Natural Hazards*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Wildavsky, Aaron**

- 1964 *The Politics of the Budgetary Process*. Boston, Massachusetts: Little, Brown and Company.

**Williams, Harry B.**

- 1964 "Human Factors in Warning-and-Response Systems." Pages 79-104 in George H. Grosser, Henry Wechsler and Milton Grenblat (editors *The Threat of Impending Disaster*). Cambridge, Massachusetts: The M.I.T. Press.

**Wolfenstein, Martha**

- 1957 *Disaster: A Psychological Essay*. Glencoe, Illinois: Free Press.

**Yutzy, Daniel**

- 1970 "Priorities in Community Response." *American Behavioral Scientist* 13, pp. 344-353.

**AVALANCHE****Assessment of Research on Natural Hazards**

- 1975 *Snow Avalanche Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Bradley, Charles C.**

- 1966 "The Snow Resistograph and Slab Avalanche Investigations." In *International Symposium on Scientific Aspects of Snow and Ice Avalanches*. Publication #69. Gentbrugge, Belgium: International Association of Scientific Hydrology.

**British Meteorological and Meteorological**



n, M.

n Avalanche Classification, a Further  
tribution." In *International Symposium  
Scientific Aspects of Snow and Ice  
Avalanches*. Publication #69. Gentbrugge,  
Belgium: International Association of  
Scientific Hydrology.

a Little Cottonwood Canyon: General  
m. A Report Prepared for Salt Lake  
County and the Town of Alta. San  
Francisco: Eckbo, Dean, Austin and  
Williams, Environmental Planners.

n  
Avalanche Enigma. New York: Rand  
Nally.

ns (translator)

avalanche Control in the Starting Zone.  
ation Paper #71. U.S. Forest Service. Fort  
Collins, Colorado: Rocky Mountain Forest  
and Range Experiment Station.

ow Avalanches Along Colorado  
Mountain Highways. Research Report  
M-7. U.S. Forest Service. Fort Collins,  
Colorado: Rocky Mountain Forest and  
Range Experiment Station.

Behavior of Avalanches in Areas Controlled  
Supporting Structures." In *International  
Symposium on Scientific Aspects of Snow  
and Ice Avalanches*. Publication #69.  
Gentbrugge, Belgium: International  
Association of Scientific Hydrology.

Avalanche Zoning Plan. Translation  
Alta, Utah: Alta Avalanche Study  
Center.

avalanche Hazard Inventory and Land Use  
Control for the City and Borough of Juneau,  
Alaska. Unpublished report. U.S. Forest  
Service. Fort Collins, Colorado: Rocky  
Mountain Forest and Range Experiment  
Station.

ne and M. Martinelli

Gardner, Noel C. and Arthur Judson

1970 *Artillery Control of Avalanches Along  
Mountain Highways*. Research Paper #RM-  
61. U.S. Forest Service. Fort Collins,  
Colorado: Rocky Mountain Forest and  
Range Experiment Station.

International Association of Scientific Hydrology

1966 *International Symposium on Scientific  
Aspects of Snow and Ice Avalanches*.  
Publication #69. Gentbrugge, Belgium.

Iveronova, M. I.

1966 "The Hydrologic Role of Snow Avalanches."  
In *International Symposium on Scientific  
Aspects of Snow and Ice Avalanches*.  
Publication #69. Gentbrugge, Belgium:  
International Association of Scientific  
Hydrology.

LaChapelle, Edward R.

1966 "Avalanche Forecasting — Modern  
Synthesis." In *International Symposium on  
Scientific Aspects of Snow and Ice  
Avalanches*. Publication #69. Gentbrugge,  
Belgium: International Association of  
Scientific Hydrology.

1966 *Reforestation in the Austrian Alps*.  
Miscellaneous Report #9. Alta, Utah: Alta  
Avalanche Study Center.

1968 *The Behrends Avenue Avalanche and Other  
Avalanche Hazards*. A Report to the Greater  
Juneau Borough, Alaska. Alta, Utah: Alta  
Avalanche Study Center.

LaChapelle, Edward R., and R. M. Stillman

1966 "The Control of Snow Metamorphism by  
Chemical Agents." In *International  
Symposium on Scientific Aspects of Snow  
and Ice Avalanches*. Publication #69.  
Gentbrugge, Belgium: International  
Association of Scientific Hydrology.

Martinelli, M., Jr.

1974 *Snow Avalanche Sites, Their Identification  
and Evaluation*. Forest Service. Washington:  
U.S. Department of Agriculture.

**Perla, Ronald L.**

1968 *Modern Avalanche Rescue*. Snow Safety Guide #1. Alta, Utah: Alta Avalanche Study Center.

1973 *Advances in North American Avalanche Technology: 1972 Symposium*. Forest Service, U.S. Department of Agriculture. Fort Collins, Colorado: Rocky Mountain Forest and Range Experiment Station.

**Stillman, R. M.**

1968 *A Tabulation of Snow Avalanche Fatalities in Colorado*. Report #8. Alta, Utah: Alta Avalanche Study Center.

**U.S. Forest Service**

1968 *Snow Avalanches: A Handbook of Forecasting and Control Measures*. USDA Agricultural Handbook #194. Washington: U.S. Government Printing Office.

## COASTAL EROSION

**Bruun, Per**

1968 "Beach Erosion and Coastal Protection." In Rhodes W. Fairbridge (editor) *Encyclopedia of Geomorphology*. New York: Van Nostrand Reinhold.

**Corps of Engineers**

1960 *Survey Investigations and Reports Manual: Beach Erosion Control Benefits*. #EM 1120-2-108. Washington: U.S. Government Printing Office.

1969 *Creation and Stabilization of Coastal Barrier Dunes*. Report #3-69. Washington: Coastal Engineering Research Center.

1970 *Shore Protection Program*. Washington: Office of the Chief of Engineers.

1971 *Shore Management Guidelines: National Shoreline Study*. Washington: U.S. Government Printing Office.

1971 *Shore Protection Guidelines: National Shoreline Study*. Washington: U.S. Government Printing Office.

1973 *Ecological Effects of Offshore Dredging and Beach Nourishment: A Review*. Miscellaneous Paper #1-73. Washington: Coastal Engineering Research Center.

**Dolan, Robert, Paul J. Godfrey, and William E. Odum**  
1973 "Man's Impact on the Barrier Islands of North Carolina." *American Scientist* 61 (March-April), pp. 152-166.

**Govatos, George and Iraj Zandi**

1969 "Beach Nourishment from Offshore Sources." *Shore and Beach* 37 (October), pp. 40-49.

**Inman, Douglas L. and Birchard M. Brush**

1973 "The Coastal Challenge." *Science* 181, pp. 20-32.

**Ketchum, Bostwick H.**

1972 *The Water's Edge: Critical Problems of the Coastal Zone*. Cambridge, Massachusetts: The M.I.T. Press.

**Laird, Beverly L., et al.**

1973 *Documents Related to Management of the Coastal Zone: An Annotated Bibliography*. Virginia Institute of Marine Science Report #40. Gloucester Point, Virginia: University of Virginia.

**Mitchell, James Kenneth**

1968 *A Selected Bibliography of Coastal Erosion, Protection, and Related Human Activity in North America and the British Isles*. Natural Hazards Research Working Paper No. 4. Toronto: University of Toronto.

1974 *Community Response to Coastal Erosion: Individual and Collective Adjustments to Hazard on the Atlantic Shore*. Chicago: University of Chicago Press.

**Shepard, Francis P. and Harold R. Wanless**

1971 *Our Changing Coastlines*. New York: McGraw-Hill.

**Sorenson, John H. with J. K. Mitchell**

1975 *Coastal Erosion Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science.

**Steers, James A.**

1953 *The Sea Coast*. London: Collins.

**Tabb, R. P.**

- 1967 "Status and General Aspects of Beach Erosion Control Program in Florida." *Shore and Beach* 35 (October), pp. 24-27.

**U.S. Senate, Committee on Commerce**

- 1972 *National Coastal Zone Management Act of 1972*. Report of the Senate Committee on Commerce on S. 3507. Senate Report #92-753. 92nd Congress, second session. Washington: U.S. Government Printing Office.

**Wilson, Harold F.**

- 1964 *The Story of the Jersey Shore*, Volume 4. The New Jersey Historical Series. Princeton, New Jersey: D. Van Nostrand.

## DROUGHT

**Bennett, John**

- 1969 *Northern Plainsmen*. Chicago: Aldine.

**Borchert, John R.**

- 1971 "The Dust Bowl in the 1970's." *Annals of the Association of American Geographers* 61, pp. 1-22.

**Brooks, Reuben H.**

- 1971 "Human Response to Recurrent Drought in Northeastern Brazil." *Professional Geographer* 23, pp. 40-44.

**Brown, Lester**

- 1970 *Seeds of Change*. New York: Praeger.

**Bryson, R. A. and D. A. Baerreis**

- 1967 "Possibilities of Major Climatic Modification and Their Implications: Northwest India, a Case for Study." *Bulletin of the American Meteorological Society* 48, pp. 136-142.

**Bryson, Reid A.**

- 1972 "Climatic Modification by Air Pollution." Report 1. Madison: University of Wisconsin Institute for Environmental Studies.
- 1973 "Climatic Modification by Air Pollution, II: The Sahelian Effect." Report 9. Madison: University of Wisconsin Institute for Environmental Studies.

**Gatewood, J. S., et al.**

- 1964 *General Effects of Drought on Water Resources for the Southwest*. U.S. Geological Survey Professional Paper #372-B. Washington: U.S. Government Printing Office.

**Gifford, R. O., G. L. Ashcroft and M. D. Magnuson**

- 1967 *Probability of Selected Precipitation Amounts in the Western Region of the United States*. Publication #t-8. Reno: University of Nevada Agricultural Experiment Station.

**Great Plains Committee**

- 1937 *The Future of the Great Plains*. 75th Congress, first session. Document #114. Washington: U.S. Government Printing Office.

**Heathcote, R. L.**

- 1969 "Drought in Australia: A Problem of Perception." *Geographical Review* 59, pp. 175-194.

**Hewes, Leslie**

- 1958 "Wheat Failure in Western Nebraska, 1931-54." *Annals of the Association of American Geographers* 48, pp. 375-397.

**Kraenzel, Carl Frederick**

- 1955 *The Great Plains in Transition*. Norman: University of Oklahoma.

**Nace, R. L. and E. J. Pluhowski**

- 1965 *Drought of the 1950's with Special Reference to the Midcontinent*. Geological Survey Water Supply Paper #1804. Washington: U.S. Government Printing Office.

**Namias, J.**

- 1963 "Surface-atmosphere Interactions as Fundamental Causes of Drought and Other Climatic Fluctuations." In *Changes of Climate: Proceedings of the Rome Symposium*. Geneva, Switzerland: UNESCO and the World Meteorological Organization.

Palmer, Wayne C. and Lyle M. Denny

- 1971 *Drought Bibliography*. National Oceanic and Atmospheric Administration, NOAA Technical Memorandum EDS 20. Silver Spring, Maryland.

The Rockefeller Foundation

- 1974 "Weather and Climate Change, Food Production and Interstate Conflict." Report of a Conference held at the Rockefeller Foundation, New York City, January 24-25, 1974.

Russell, Clifford S., David G. Arey, and Robert W. Kates

- 1970 *Drought and Water Supply: Implications of the Massachusetts Experiences for Municipal Planning*. Baltimore: Johns Hopkins.

Saarinen, Thomas F.

- 1966 *Perception of Drought Hazard on the Great Plains*. Department of Geography Research Paper #106. Chicago: University of Chicago.

Special Assistant to the President for Public Works Planning

- 1958 *Drouth: A Report*. Washington: U.S. Government Printing Office.

Tannehill, Ivan Ray

- 1947 *Drought: Its Causes and Effects*. Princeton, New Jersey: Princeton University Press.

Thomas H. E.

- 1962 *The Meteorologic Phenomenon of Drought in the Southwest*. U.S. Geological Survey Professional Paper #372-A. Washington: U.S. Government Printing Office.
- 1963 *General Summary of Effects of the Drought in the Southwest*. U.S. Geological Survey Professional Paper #372-H. Washington: U.S. Government Printing Office.

U.S. Geological Survey

- 1968 *The Northeast Water Supply Crisis of the 1960's*. Washington: U.S. Government Printing Office.

Wade, Nicholas

- 1974 "Sahelian Drought: No Victory for Western Aid." *Science* 185, pp. 234-237.

Yarrick, Richard

## EARTHQUAKE

Ad Hoc Panel on Earthquake Prediction

- 1965 *Earthquake Prediction: A Proposal for a Ten-Year Program of Research*. Prepared for the Office of Science and Technology, Washington.

Algermissen, S. T.

- 1969 "Seismic Risk Map of Conterminous U.S." Environmental Science Services Administration.

Ayre, Robert S., et al.

- 1975 *Earthquake and Tsunami Hazards in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

Blaufarb, H. and J. Levine

- 1972 "Crisis Intervention in an Earthquake." *Social Work* 17, pp. 16-19.

Bowden, M. J. and Robert W. Kates

- 1974 "The Coming San Francisco Earthquake: After the Disaster." In Harold C. Cochrane, et al., *Social Science Perspectives on the Coming San Francisco Earthquake: Economic Impact, Prediction and Reconstruction*. Natural Hazard Research Working Paper #25. Boulder: University of Colorado Institute of Behavioral Science.

California Legislature

- 1971 *Earthquake Risk: Conference Proceedings*. September 22-24, 1971. Sacramento: Joint Committee on Seismic Safety, California Legislature.
- 1971 *The San Fernando Earthquake of February 9, 1971 and Public Policy*. Sacramento: Joint Committee on Seismic Safety.
- 1974 *Meeting the Earthquake Challenge*. Final Report to the Legislature. Sacramento: Joint Committee on Seismic Safety, California Legislature.

California State Earthquake Investigation Commission

- 1908-10 *The California Earthquake of April 18, 1906*. Washington: Carnegie Institution (reprinted 1969).

*Social Science Perspectives in the Coming San Francisco Earthquake — Economic Impact, Prediction and Reconstruction.* Natural Hazard Research Working Paper #25. Boulder: University of Colorado Institute of Behavioral Science.

an, Jerry L. and Carl A. von Hake (editors)  
*Earthquake History of the United States.* Environmental Data Service, U.S. Department of Commerce, Washington: U.S. Government Printing Office.

sh, Joseph D. and George F. Wirth  
*A Preliminary Study of Engineering Seismology Benefits.* Rockville, Maryland: Environmental Science Services Administration, U.S. Coast and Geodetic Survey.

R. R., J. E. Haas and E. L. Quarantelli  
*Some Preliminary Observations in Organizational Responses in the Emergency Period After the Niigata, Japan Earthquake of June 17, 1964.* Research Report #11. Columbus, Ohio: Disaster Research Center, Ohio State University.

ake Engineering Research Center  
*Abstract Journal in Earthquake Engineering.* Berkeley: University of California.

ake Engineering Research Institute  
*Earthquake and Fire.* Prepared by the Committee on Fire Protection. San Francisco, California.

*Learning from Earthquakes.* Working Draft. Volume 1, Planning Guide; Volume 2, Engineering Field Guide; Volume 3, Geoscience Field Guide; Volume 4, Social Science Field Guide; Volume 5, Special Topics. Berkeley: University of California.

Edwin B.  
*The Alaska Earthquake of March 27, 1964: Lessons and Conclusions.* Geological Survey Professional Paper #546. Washington: U.S. Department of the Interior.

mental Science Services Administration  
*ESSA Symposium on Earthquake Prediction.* Washington: U.S. Government

1969 *Studies in Seismicity and Earthquake Damage Statistics, 1969: Summary and Recommendations; Appendix A; Appendix B.* U.S. Coast and Geodetic Survey, Washington: U.S. Department of Commerce.

Federal Council for Science and Technology  
1968 *Proposal for a Ten-Year National Earthquake Hazards Program.* Ad Hoc Interagency Working Group for Earthquake Research. Washington.

Federal Insurance Administration  
1971 *Report to the Congress: Earthquake Insurance.* Washington: U.S. Department of Housing and Urban Development.

Freeman, John R.  
1932 *Earthquake Damage and Earthquake Insurance.* New York: McGraw-Hill.

Friedman, D. G.  
1969 "Computer Simulation of the Earthquake Hazards." Pages 153-181 in Office of Emergency Preparedness *Geologic Hazards and Public Problems, Conference Proceedings.* Executive Office of the President. Washington: U.S. Government Printing Office.

1973 "Analysis for Earthquake Insurance." In *Earthquakes and Insurance.* Pasadena: California Institute of Technology.

Furomoto, Augustine S., et al.  
1972 *A Study of Past Earthquakes, Isoseismic Zones of Intensity and Recommended Zones for Structural Design for Hawaii.* Honolulu: University of Hawaii Center for Engineering Research.

Haas, J. Eugene  
1974 "Forecasting the Consequences of Earthquake Forecasting." Paper presented at the American Association for the Advancement of Science meetings in San Francisco, February 24-March 1. Boulder: University of Colorado Institute of Behavioral Science.

Haas, J. Eugene and William A. Anderson  
1974 "Coping with Socioeconomic Problems Following a Major Earthquake." Paper presented at Engineering Foundation Conference on Earthquake and Lifeline

**Haas, J. Eugene and Robert S. Ayre**

- 1970 *The Western Sicily Earthquake Disaster of 1968*. National Academy of Engineering.

**Hadley, Jarvis B. and James F. Devine**

- 1974 "Seismotectonic Map of the Eastern United States." Miscellaneous Field Studies Map #MF-620. Prepared in cooperation with the U.S. Atomic Energy Commission. U.S. Geological Survey.

**Hollis, Edward P.**

- 1971 *Bibliography of Earthquake Engineering*. Oakland, California: Earthquake Engineering Research Institute.

**Iacopi, Robert**

- 1964 *Earthquake Country*. Menlo Park, California: Lane Books.

**Joint Panel on the San Fernando Earthquake**

- 1971 *The San Fernando Earthquake of February 9, 1971: Lessons From a Moderate Earthquake on the Fringe of a Densely Populated Region*. Washington: National Academy of Science, National Academy of Engineering.

**Kates, Robert W., et al.**

- 1973 "Human Impact of the Managua Earthquake Disaster." *Science* 182, pp. 981-990.

**Kennedy, Will C.**

- 1971 *Earthquake in Chile: A Study of Organizational Response*. Working Paper #33. Columbus: The Ohio State University Disaster Research Center.

**Kunreuther, Howard and Alissandra S. Fiore**

- 1966 *The Alaskan Earthquake: A Case Study in the Economics of Disaster*. Study #S-228. Institute for Defense Analyses, Economic and Political Studies Division.

**Lew, H. S., E. V. Leyendecker, and R. D. Dikkers**

- 1971 *Engineering Aspects of the 1971 San Fernando Earthquake*. NBS Building Science Series #40. U.S. Department of Commerce. Washington: U.S. Government Printing Office.

**Mader, G. G.**

- 1972 "Land Use Planning." In G. O. Gates (editor) *The San Fernando Earthquake of February*

**McClure, Frank E.**

- 1973 *Performance of Single Family Dwelling the San Fernando Earthquake of February 9, 1971*. Report prepared for the National Oceanic and Atmospheric Administration. Washington: U.S. Department of Commerce and U.S. Department of Health, Education and Welfare.

**Mukerjee, Tapan**

- 1971 *Economic Analysis of Natural Hazards: Preliminary Study of Adjustments to Earthquakes and Their Costs*. National Hazards Research Working Paper #1. Boulder: University of Colorado Institute of Behavioral Science.
- 1972 "The Economics of Optimal Adjustment to Earthquakes." Presented at the 1972 Annual Conference of the Western Economics Association, Santa Clara, 1972. Stockton, California: University of California, Department of Economics.

**National Academy of Sciences**

- 1969 *Earthquake Engineering Research*. A Report to the National Science Foundation prepared by the Committee on Earthquake Engineering Research, Division of Engineering, National Research Council. Washington: National Academy of Sciences.
- 1969 *Toward Reduction of Losses from Earthquakes: Conclusions from the Great Alaskan Earthquake of 1964*. Committee on the Alaska Earthquake, National Research Council, Washington.
- 1970 *The Great Alaska Earthquake of 1964: Human Ecology*. Committee on Alaska Earthquake, Washington: National Academy of Sciences Printing Office.
- 1971 *The San Fernando Earthquake of February 9, 1971*. Joint Panel on the San Fernando Earthquake. Division of Earth Sciences, Washington: National Academy of Sciences.
- 1971 *The Great Alaska Earthquake of 1964: Biology*. National Research Council. Committee on the Alaska Earthquake, Washington: National Academy of Sciences.

- 1972 *The Great Alaska Earthquake of 1964: Oceanography and Coastal Engineering*

- 1972 *The Great Alaska Earthquake of 1964: Summary and Recommendations*. National Research Council, Committee on the Alaska Earthquake. Washington: National Academy of Sciences.

#### National Bureau of Standards

- 1971 *The San Fernando, California Earthquake of February 9, 1971*. Institute of Applied Technology. Washington: U.S. Department of Commerce.
- 1973 *Building Practices for Disaster Mitigation*. Edited by Richard Wright, Samuel Kramer and Charles Culver. NBS Building Science Series #46. U.S. Department of Commerce. Washington: U.S. Government Printing Office.
- 1974 *Design, Siting and Construction of Low-Cost Housing and Community Buildings to Better Withstand Earthquakes and Windstorms*. Edited by William F. Reps and Emil Simiu. Report prepared for U.S. Agency for International Development by Center for Building Technology, Institute for Applied Technology. Washington: U.S. Government Printing Office.

#### National Earthquake Information Center

- 1969 *Earthquake Investigations in the United States*. U.S. Coast and Geodetic Survey Paper #282. Washington: U.S. Department of Commerce.

#### National Oceanic and Atmospheric Administration

- 1928- *United States Earthquakes*. Published Annually. Washington: U.S. Department of Commerce.
- 1972 *A Study of Earthquake Losses in the San Francisco Bay Area: Data and Analysis*. A Report prepared for the Office of Emergency Preparedness. Washington: U.S. Department of Commerce.
- 1973 *Contributions to Seismic Zoning*. NOAA Technical Report ERL 267-ESL 30. Environmental Research Laboratory. Washington: U.S. Government Printing Office.
- 1973 *A Study of Earthquake Losses in the Los*

#### National Science Foundation

- 1972 *Proceedings of the International Conference on Microzonation for Safer Construction Research and Application*. Seattle, Washington.

#### Nichols, D. R. and J. M. Buchanan-Banks

- 1974 *Seismic Hazards and Land Use Planning*. U.S. Geological Survey Circular 690. Washington: U.S. Government Printing Office.

#### O'Connor, Charles J., et al.

- 1973 *San Francisco Relief Survey*. Compilation of Studies made for the Russell Sage Foundation. New York: Survey Associates.

#### Office of Emergency Preparedness

- 1973 *Interim Federal Earthquake Response Plan*. Executive Office of the President. Washington.

#### Office of Science and Technology

- 1970 *Earthquake Hazard Reduction*. Report on the Task Force on Earthquake Hazard Reduction. Executive Office of the President. Washington: U.S. Government Printing Office.

#### Olson, Robert A. and Mildred M. Wallace (editors)

- 1969 *Geologic Hazards and Public Problems: Conference Proceedings*. Conference held May 27-28 by Office of Emergency Preparedness, Region Seven, Santa Rosa, California. Executive Office of the President, Emergency Preparedness Office. Washington.

#### Rogers, George W.

- 1970 "Economic Effects of the Earthquake." Pages 58-76 in National Academy of Sciences *The Great Alaska Earthquake of 1964: Human Ecology*. Washington: National Academy of Sciences.

#### San Francisco Department of City Planning

- 1974 *Community Safety Plan for the Comprehensive Plan of San Francisco: A Proposal for Citizen Review*. San Francisco, California.

- 1968 *Earthquake Hazard in the San Francisco Bay Area: A Continuing Problem in Public Policy*. Berkeley, California: University of California Institute of Governmental Studies.
- U.S. Department of Commerce**
- 1969 *Earthquake Investigation in the United States*. U.S. Coast and Geodetic Survey Publication #282. Revised. Washington: U.S. Government Printing Office.
- U.S. Geological Survey**
- 1970 *The San Francisco Earthquake and Fire of April 18, 1906 and Their Effects on Structures and Structural Materials*. U.S. Geological Survey Bulletin #324. U.S. Department of the Interior. Washington: U.S. Government Printing Office.
- 1974 *Goals, Strategy, and Tasks of the Earthquake Hazard Reduction Program*. Geological Survey Circular 701. U.S. Department of the Interior. Reston, Virginia: U.S. Geological Survey, National Center.
- U.S. Senate**
- 1971 *Governmental Response to the California Earthquake Disaster of February 1971*. Hearing before the Committee on Public Works, San Fernando, California. 92nd Congress, first session. Washington: U.S. Government Printing Office.
- Whiteman, R. V.**
- 1973 "Earthquake Damage Probability Matrices." *Preprints, Fifth World Conference on Earthquake Engineering*. Paper #321. Rome, Italy: Italian Association of Earthquake Engineers.
- 1973 *Seismic Design Decision Analysis: Summary of Methodology and Pilot Application*. Structures Publications #381. Cambridge: Massachusetts Institute of Technology, School of Engineering.
- Wiegel, Robert L. (editor)**
- 1970 *Earthquake Engineering*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Wiggins, John H. Jr., and Donald F. Moran**
- 1971 *Earthquake Safety in the City of Long Beach Based on the Concept of Balanced Risk*. Palos Verdes Estates, California: J. H. Wiggins Company.
- 1960 *Proceedings, Second Conference*. Science Council of Japan.
- 1965 *Proceedings, Third Conference*. Wellington: New Zealand National Committee for Earthquake Engineering, New Zealand Institute of Engineers.
- 1969 *Proceedings, Fourth Conference*. Santiago, Chile.
- 1973 *Proceedings, Fifth Conference*. Rome, Italy.
- Yutzy, Daniel**
- 1964 *Aesop, 1964 -- Contingencies Affecting the Issuing of Public Disaster Warnings*. Crescent City, California: Disaster Research Center, Research Note #4. Columbus, Ohio: Ohio State University.
- FLOOD**
- Andrews, Wade H. and Dennis C. Geertsen**
- 1974 *Social Dimensions of Urban Flood Hazard: Decisions*. Institute for Social Research on Natural Resources, Report #1. Logan, Utah: Utah State University.
- Brown, John P., Bruno Contini and C. B. M. Brown**
- 1972 "An Economic Model of Floodplain Development, Land Use and Land Use Policy." *Water Resources Research* 8, pp. 18-32.
- Burton, Ian**
- 1962 *Types of Agricultural Occupancy of Flooded Plains in the United States*. Department of Geography Research Paper #75. Chicago: University of Chicago Press.
- Burton, Ian and Robert W. Kates**
- 1964 "The Floodplain and the Sea: A Comparative Analysis of Hazard and Occupancy." *Geographical Review* 54, pp. 366-385.
- Burton, Ian, Robert W. Kates and Rodman F. Kates**
- 1969 *The Human Ecology of Coastal Hazard in Megalopolis*. Department of Geography Research Paper #115. Chicago: University of Chicago Press.



, R. A.

*The Rio Grande Flood: A Comparative Study of Border Communities in Disaster.* Disaster Study #7. National Academy of Sciences, National Research Council. Washington.

Neil R.

*Effects of Upstream Flood Protection on Land Use, with Special Reference to the Upper Washita Basin of Oklahoma.* Stillwater: Oklahoma State University and Resource Development Economics Division of Economic Research Service, U.S. Department of Agriculture.

f Engineers

*308 Report.* U.S. Department of the Army. Washington: U.S. Government Printing Office.

on Environmental Quality

*Report on Channel Modifications.* Prepared by Arthur D. Little Incorporated. Washington: U.S. Government Printing Office.

Donald Ross

*Decision Making Under Uncertainty in Systems Hydrology.* Technical Reports on Natural Resource Systems #2. Tucson: University of Arizona.

Flood Warning Systems"

*Bulletin of the American Meteorological Society* 53, (July), p. 670.

n, D. G. and T. S. Roy

*Simulation of Total Flood Loss Experience on Dwellings on Inland and Coastal Flood Plains.* Report prepared for the U.S. Department of Housing and Urban Development. Hartford, Connecticut: The Travelers Insurance Company.

I, James E.

*An Evaluation of Urban Flood Plains.* Technical Memorandum #19. New York: American Society of Civil Engineers.

Holmes, R. C.

1961 "Composition and Size of Flood Losses." In G. F. White (editor) *Papers on Flood Problems.* Department of Geography Research Paper #70. Chicago: University of Chicago Press.

Hoyt, William G. and Walter B. Langbein

1955 *Floods.* Princeton, New Jersey: Princeton University Press.

Institute for Water Resources

1969 *The Relationship Between Land Values and Flood Risk in the Wabash River Basin.* Report #69-4. Corps of Engineers, U.S. Department of the Army. Washington: U.S. Government Printing Office.

Instituut voor Sociaal Onderzoek van het Nederlandse Volk

1955 *Studies on Holland Flood Disaster 1953.* Four Volumes. Washington: National Academy of Sciences, National Research Council.

James, L. D.

1964 *A Time-Dependent Planning Process for Combining Structural Measures, Land Use, and Flood Proofing to Minimize the Economic Cost of Floods.* Report #EEP-12. Palo Alto: Stanford University Institute of Engineering-Economic Systems.

1965 "Nonstructural Measures for Flood Control." *Water Resources Research* 1, pp. 9-24.

1967 "Economic Analysis of Alternative Flood Control Measures." *Water Resources Research* 3, pp. 333-343.

James, L., Douglas, Eugene A., Laurent and Duane W. Hill

1971 *The Flood Plain as a Residential Choice: Resident Attitudes and Their Implications to Flood Plain Management.* Atlanta: Georgia Institute of Technology, Environmental Resources Center.

Kates, Robert W.

1962 *Hazard and Choice Perception in Flood Plain Management* Department of Geography Research Paper #78. Chicago: University of Chicago Press.

Lind, R. C.

- 1967 "Flood Control Alternatives and the Economics of Flood Protection." *Water Resources Research* 3, pp. 345-357.

Meta Systems, Incorporated

- 1972 *The NOAA Flood Warning System: A Case Study of Tropical Storm Agnes*. Prepared for the National Oceanic and Atmospheric Administration. Cambridge, Massachusetts.

Murphy, F. C.

- 1958 *Regulating Flood Plain Development*. Department of Geography Research Paper #56. Chicago: University of Chicago Press.

National Advisory Committee on Oceans and Atmosphere

- 1972 *The Agnes Floods: A Post-Audit of the Effectiveness of the Storm and Flood Warning System of NOAA*. Washington: U.S. Government Printing Office.

National Oceanic and Atmospheric Administration

- 1969 *A Plan for Improving the National River and Flood Forecast and Warning Service*. Office of Hydrology. Silver Spring, Maryland: U.S. Department of Commerce.

North East Appraisals, Incorporated

- 1974 *Flood Risk Handbook for Rural Advisors*. Prepared for "Project Agnes," Cornell University Water Resources and Marine Sciences Center, in cooperation with the New York State Soil and Water Conservation Committee. Ithaca, New York.

Office of Water Resources Research

- 1965- *Water Resources Research Catalog*. Published annually. Water Resources Scientific Information Center, U.S. Department of the Interior. Washington: U.S. Government Printing Office.

Poertner, Herbert G., et al.

- 1966 *Urban Drainage Practices, Procedures, and Needs*. Chicago: American Public Works Association Research Foundation.

Schneider, William J. and James E. Godwin

Shaeffer, John R., et al.

- 1967 *Introduction to Flood Proofing*. Center for Urban Studies. Chicago: University of Chicago Press.

Simkowski, Nancy Alberta

- 1973 *The Structure of Influence in the Adoption of Flood Plain Regulations*. M.A. Thesis. Boulder: University of Colorado Department of Geography.

Task Force on Federal Flood Control Policy

- 1966 *A Unified National Program for Managing Flood Losses*. House Document #465. Washington: U.S. Government Printing Office.

Tennessee Valley Authority Technical Library

- 1973 *Flood Damage Prevention: An Indexed Bibliography*. Seventh edition. Knoxville, Tennessee.

Thieler, Donald

- 1969 *Effects of Flood Protection on Land Use in Coon Creek Watershed*. Masters Thesis. Chicago: University of Chicago.

U.S. Comptroller General

- 1975 *National Attempts to Reduce Losses from Floods by Planning for and Controlling the Uses of Flood-Prone Lands*. Report to the Congress. Washington: General Accounting Office.

U.S. Congress

- 1966 "A Unified National Program for Managing Flood Losses." Report of the National Task Force for Flood Control, House Document 465, 89th Congress, second session. Washington: U.S. Government Printing Office.

U.S. Water Resources Council

- 1971 *Regulation of Flood Hazard Areas*. Washington: U.S. Government Printing Office.
- 1972 *A Unified National Program for Flood Plain Management*. Washington: U.S. Water Resources Council.
- 1972 *Regulation of Flood Hazard Areas to Reduce Flood Losses*. Washington: U.S. Water Resources Council.

## White, Gilbert F. (Continued)

- 1964 *Choice of Adjustment to Floods*. Department of Geography Research Paper #93. Chicago: University of Chicago Press.
- 1966 "Optimal Flood Damage Management: Retrospect and Prospect." In Allen V. Kneese and Stephen C. Smith (editors) *Water Research*. Baltimore: Johns Hopkins Press.
- White, Gilbert F., et al.
- 1958 *Changes in Urban Occupance of Flood Plains in the United States*. Department of Geography Research Paper #57. Chicago: University of Chicago Press.
- 1975 *Flood Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

## FROST

- Chang, J.
- 1968 *Climate and Agriculture: An Ecological Survey*. Chicago: Aldine.
- Friedman, D. G.
- 1959 *A Frost Survey of the Coachella Valley in Southern California*. Travelers Weather Research Center Occasional Paper in Meteorology #3. Hartford, Connecticut: The Travelers Insurance Company.
- Hurst, G. W. and R. P. Rumney
- 1971 *Protection of Plants Against Adverse Weather*. WMO Technical Note #18. Geneva, Switzerland: World Meteorological Organization.
- Huszar, Paul C.
- 1975 *Frost Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).
- Myrick, Dana
- 1970 *All-risk Crop Insurance: Principles, Problems, Potentials*. Montana Agricultural Experiment Station Bulletin #640. Bozeman: Montana State University.

## Schultz, H. B.

- 1962 "The Interaction of the Macro and Microclimatic Factors Contributing to the Success of Wind Machines for Frost Protection in Southern California." Pages 614-629 in *Biometeorology*. Elmsford, New York: Pergamon Press.

## U.S. Department of Agriculture

- 1970 *Economic Considerations in Crop Insurance*. Washington: U.S. Government Printing Office.

## Ward, Robert M.

- 1971 *Cold and Wind Hazard Perception by Orange and Tomato Growers in Central and South Florida*. Doctoral Thesis. Ann Arbor: University of Michigan Department of Geography.

## World Meteorological Organization

- 1963 *Protection Against Frost Damage*. WMO Technical Note #51. Geneva, Switzerland.

## Young, F. D.

- 1947 *Frost and the Prevention of Frost Damage*. U.S. Weather Bureau Report #1484, U.S. Department of Commerce. Washington: U.S. Government Printing Office.

## HAIL

## Battan, L. J.

- 1969 "Comments on Silver Iodide Seeding and Hailfall Damage Suppression." *Journal of Applied Meteorology* 8, pp. 446-469.

## Blackmer, R. H., et al.

- 1959 *The Hail Hazard in Illinois*. CHIAA Report #1. Chicago: Crop-Hail Insurance Actuarial Association.

## Boone, Larry

- 1974 *Estimating Crop Losses Due to Hail*. Economic Research Service. Lincoln, Nebraska: U.S. Department of Agriculture.

## Boutin, C., H. Isaka and T. Sonlage

- 1970 "Statistical Studies on Operations for Hail

- During 1915-50." *Transactions of the Illinois Academy of Science* 53, pp. 146-156.
- 1967 "Areal-Temporal Variations of Hail Intensity in Illinois." *Journal of Applied Meteorology* 6, pp. 536-541.
- 1970 "Hailstreaks." *Journal of the Atmospheric Sciences* 27, pp. 109-125.
- 1971 "Hailfall Characteristics Related to Crop Damage." *Journal of Applied Meteorology* 10, pp. 270-274.
- 1972 "Examples of Economic Losses from Hail in the United States." *Journal of Applied Meteorology* 11, pp. 1128-1137.
- Changnon, S. A., Jr. and G. M. Morgan Jr.  
1974 *Design of an Experiment to Suppress Hail*. Urbana, Illinois: Illinois State Water Survey.
- Changnon, S. A., Jr. and G. E. Stout  
1967 "Crop-Hail Intensities in Central and Northwest United States." *Journal of Applied Meteorology* 6, pp. 542-548.
- Crop-Hail Insurance Actuarial Association  
1971 "Crop-Hail Insurance and Multiple Peril Crop Insurance Statistics." Chicago: Crop-Hail Insurance Actuarial Association.
- Dennis, A. S.  
1970 "The Theory and Practice of Hail Suppression." *The Journal of Weather Modification* 2, pp. 147-154.
- Haas, J. Eugene and Sigmund Krane  
1973 *Social Implications of the National Hail Research Experiment: 1973 Final Report*. Loveland, Colorado: Human Ecology Research Service.
- Henderson, T. J.  
1970 "Results of a Two-Year Operational Hail Suppression Program in Kenya, East Africa." *Preprints of Second National Conference on Weather Modification* (Santa Barbara, California). Boston, Massachusetts: American Meteorological Society.
- Lemons, H.  
1942 "Hail in American Agriculture." *Economic Geography* 18, pp. 363-378.
- Schleusener, R. A., et al.  
1972 "Hail Experience on Eight Project Seasons of Cloud Seeding with Silver Iodide in the Northern Great Plains." *Journal de Recherches Atmospheriques* 6, pp. 519-528.
- Stout, G. E. and S. A. Changnon, Jr.  
1968 *Climatology of Hail in the Central United States*. CHIAA Report #38, Chicago: Crop-Hail Insurance Actuarial Association.
- Summers, P. W.  
1973 "Project Hailstop: A Review of Accomplishments to Date." *Journal of Weather Modification* 5, pp. 43-55.
- Summers, P. W. and L. Wojtow  
1971 "The Economic Impact of Hail Damage in Alberta, Canada and its Dependence on Various Hailfall Parameters." *Preprints of the Seventh Conference on Severe Local Storms*. Kansas City, Missouri: American Meteorological Society.
- Williams, Merlin C.  
1973 "The South Dakota Weather Modification Program." *Journal of Weather Modification* 5, pp. 7-23.

## HURRICANE

### American Meteorological Society

- 1973 "Policy Statement of the American Meteorological Society on Hurricanes." *Bulletin of the American Meteorological Society* 54, pp. 46-47.

### Anderson, Lee G. and John M. Burnham

- 1973 "Application of Economic Analysis to Hurricane Warnings to Residential and Retail Activities in the U.S. Gulf of Mexico Coastal Region." *Monthly Weather Review* 101, pp. 126-131.

### Bates, F. L., et al.

- 1963 *The Social and Psychological Consequences of a Natural Disaster: A Longitudinal Study of Hurricane Audrey*. National Academy of Sciences, National Research Council Disaster Study #18. Washington: National Academy of Sciences Printing Office.

**Baumann, Duane D. and John H. Sims**

- 1975 "Human Response to the Hurricane." Pages 25-30 in Gilbert F. White (editor) *Natural Hazards: Local, National, Global*. New York: Oxford University Press.

**Budine, B. R.**

- 1969 *Hurricane Surge Frequency Estimated for the Gulf Coast of Texas*. Technical Memorandum #26. Coastal Engineering Research Center, Department of the Army. Washington: Corps of Engineers.
- 1971 *Storm Surge on the Open Coast: Fundamentals and Simplified Prediction*. Technical Memo #35. Coastal Engineering Research Center, Department of the Army. Washington: Corps of Engineers.

**Brinkmann, Waltraud A. R., et al.**

- 1975 *Hurricane Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Burton, Ian, Robert W. Kates and Rodman Snead**

- 1969 *The Human Ecology of Coastal Flood Hazard in Megalopolis*. Department of Geography Research Paper #115. Chicago: University of Chicago.

**Coast Code Administration**

- 1972 *Regional Code Enforcement — Hancock, Harrison and Jackson Counties, Mississippi*. Gulfport, Mississippi.

**Corps of Engineers**

- 1971 *Shore Protection Guidelines*. Washington: U.S. Government Printing Office.
- 1971 *Report on the National Shoreline Study*. Distributed by NTIS. Springfield, Virginia: U.S. Department of Commerce.

**Cry, G. W.**

- 1965 *Tropical Cyclones of the North Atlantic Ocean*. Weather Bureau Technical Paper #55. Washington: U.S. Department of Commerce.
- 1967 *Effects of Tropical Cyclone Rainfall on the Distribution of Precipitation Over the Eastern and Southern U.S.* ESSA

**Dunn, G. E. and B. Miller**

- 1960 *Atlantic Hurricanes*. Baton Rouge: Louisiana State University Press.

**Forest Service Forest Products Laboratory**

- 1963 *Wood Structures Survive Hurricane Camille's Winds*. Forest Service Research Paper #FPL-123. Madison, Wisconsin: U.S. Department of Agriculture.

**Friedman, D. G.**

- 1963 *Frequency of Hurricane Winds in Various Sections of Florida, Georgia and the Carolinas*. Hartford, Connecticut: The Travelers Insurance Company.
- 1971 *The Storm Surge Hazard Along the Gulf and South Atlantic Coastlines*. Unpublished Report. Hartford, Connecticut: The Travelers Insurance Company.

**Garstang, M.**

- 1972 "A Review of Hurricane and Tropical Meteorology." *Bulletin of the American Meteorological Society* 53, pp. 612-630.

**Gentry, R. C.**

- 1966 "Nature and Scope of Hurricane Damage." *Hurricane Symposium*. American Society for Oceanography Publication #1, pp. 229-254.
- 1969 "Project Stormfury." *Bulletin of the American Meteorological Society* 50, pp. 404-409.
- 1970 "Hurricane Debbie Modification Experiments. August 1969." *Science* 168, pp. 473-475.

**Golde, R. H.**

- 1973 *Lightning Protection*. London: Edward Arnold.

**Harris, D. L.**

- 1963 *Characteristics of the Hurricane Storm Surge*. Technical Paper #48. U.S. Weather

- Jelesnianski, C. P.  
 1972 *SPLASH (Special Program to List Amplitudes of Surges from Hurricanes), 1: Landfall Storms*. Publication #NOAA TM-NWS TDL-46. System Development Office. Silver Spring, Maryland: U.S. Department of Commerce.
- Jelesnianski, C. P. and A. D. Taylor  
 1973 *A Preliminary View of Storm Surges Before and After Storm Modifications*. Publication #ERL WMPO-3, NHRL-102. National Oceanic and Atmospheric Administration. Washington: U.S. Department of Commerce.
- Killian, L. M.  
 1954 *Evacuation of Panama City Before Hurricane Florence*. Committee on Disaster Studies, Washington.
- Miami Federal Executive Board  
 1973 *Evacuation of Coastal Residents During Hurricanes*. Report to the U.S. Office of Management and Budget on Pilot Study for Dade County, Florida. Miami, Florida.
- Minor, Joseph E., et al.  
 1972 *Impact of the Lubbock Storm on Regional Systems*. Final Report prepared for the Defense Civil Preparedness Agency. Washington: Department of Defense.
- Toore, Harry Estill  
 1963 *Before the Wind: A Study of the Response to Hurricane Carla*. Disaster Study #19. National Academy of Sciences, National Research Council. Washington.
- National Oceanic and Atmospheric Administration  
 1971 *The Homeport Story: An Imaginary City Gets Ready for a Hurricane*. U.S. Department of Commerce. Washington.
- 1962 *Designing for Hurricanes*. *Mechanical Engineering* 84 (September), pp. 40-45.
- Rosenthal, S. L. and M. S. Moss  
 1971 *Numerical Experiments of Relevance to Project Stormfury*. NOAA Technical Memorandum #ERL NHRL-95. Washington: U.S. Department of Commerce.
- Sadowski, A. F.  
 1966 "Tornadoes with Hurricanes." *Weatherwise* 19, pp. 71-75.
- Saffir, H. S.  
 1971 "Hurricane Camille: Data on Storm and Structural Damage." Paper presented at Conference on Wind Effects on Buildings and Structures, Tokyo, Japan.
- Simpson, R. H.  
 1971 *The Decision Process in Hurricane Forecasting*. NOAA Technical Memorandum #NWS SR-53. Washington: U.S. Department of Commerce.
- 1973 "Hurricane Prediction: Progress and Problem Areas." *Science* 181, pp. 899-907.
- Simpson, R. H. and M. B. Lawrence  
 1971 *Atlantic Hurricane Frequencies Along the U.S. Coastline*. NOAA Technical Memorandum #NWS SR-58. Washington: U.S. Department of Commerce.
- Sugg, Arnold L.  
 1967 "Economic Aspects of Hurricanes." *Monthly Weather Review* 95 (March), pp. 143-146.
- 1968 "Beneficial Aspects of the Tropical Cyclone." *Journal of Applied Meteorology* 7, pp. 39-45.
- Taylor, D. L.  
 1970 *The Benefits of Hurricane Runoff Water*. Master's Thesis. Fort Collins: Colorado State University.

os, Plato and Elmer Roth

"Hurricanes and Trees: Ten Lessons from Camille." *Journal of Forestry* 69, pp. 285-289.

Robert M.

"The National Hurricane Warning Program." *Bulletin of the American Meteorological Society* 53, pp. 631-633.

on, Kenneth P. and Peggy J. Ross

*Citizens' Responses to Warnings of Hurricane Camille*. Report #35. State College: Mississippi State University Social Science Research Center.

H. F. and G. E. Sherwood

*Wood Structures Survive Hurricane Camille's Winds*. Forest Service Research Paper #FPL-123. Madison, Wisconsin: U.S. Department of Agriculture.

## LANDSLIDE

Robert F.

*Landslide Hazards Related to Land Use Planning in Teton National Forest, Northwest Wyoming*. Forest Service, Intermountain Region. U.S. Department of Agriculture.

. and G. B. Cleveland

*Natural Slope Stability as Related to Geology, San Clemente Areas, Orange and San Diego Counties, California*. Special Report #98. Sacramento: California Division of Mines and Geology.

Carl E., et al.

*Landslide Susceptibility in San Mateo County, California*. Basic Data Contribution #43. San Francisco Bay Region Environment and Resources Planning Study. Menlo Park, California: U.S. Geological Survey.

a Division of Mines and Geology

"Mudslide and Landslide Prediction." *California Geology* 25 (June), p. 136.

*Urban Geology: Master Plan for California*.

Bulletin #198. Sacramento, California.

Eckel, E. B. (editor)

1958 *Landslides and Engineering Practice*. Highway Research Board Special Report #29, National Academy of Sciences, National Research Council Publication #544. Washington: National Academy of Sciences.

Evans, J. R., et al.

1971 *Analysis of Mudslide Risk in Southern Ventura County, California*. Open File Report. Sacramento, California: California Division of Mines and Geology.

McNeal, John D.

1958 "Trends." Pages 217-223 in E. B. Eckel (editor) *Landslides and Engineering Practice*. Washington: National Academy of Sciences.

Morton, D. M. and R. Streitz

1967 "Landslides." *Mineral Information Service* 20 (October), pp. 123-129; 20 (November), pp. 135-140. Sacramento: California Division of Mines and Geology.

Nilsen, T. H. and E. E. Brabb

1973 "Current Slope Stability Studies by the U.S. Geological Survey in the San Francisco Bay Region, California." *Landslide* 1 (Spring), pp. 2-10.

Root, A. W.

1958 "Prevention of Landslides." Pages 113-149 in E. B. Eckel (editor) *Landslides and Engineering Practice*. Washington: National Academy of Sciences.

Slosson, J.

1969 "The Role of Engineering Geology in Urban Planning." Pages 8-14 in *The Governor's Conference on Environmental Geology*. April 30-May 2, 1969. Sacramento: State of California.

Smith, R.

1958 "Economic and Legal Aspects." Pages 6-19 in E. B. Eckel (editor) *Landslides and Engineering Practice*. Washington: National Academy of Sciences.

Sorenson, John H., Neil J. Erickson and Dennis S.

## State of California Resources Agency

- 1965 *Landslides and Subsidence: Geologic Hazards Conference, May 26-27, 1965*. Los Angeles.

## Varnes, David

- 1958 "Landslide Types and Processes." Pages 20-47 in E. B. Eckel (editor) *Landslides and Engineering Practice*. Washington: National Academy of Sciences.

## Zaruba, Q. and V. Mencl

- 1969 *Landslides and Their Control*. New York: Elsevier Press.

## LIGHTNING

## Beck, Edward

- 1954 *Lightning Protection for Electrical Systems*. New York: McGraw-Hill.

## Changnon, Stanley A.

- 1964 "Climatology of Damaging Lightning in Illinois." *Monthly Weather Review* 92, pp. 115-120.

## Dennett, Joann Temple

- 1970 "Lightning -- Science Strikes Back." *ESSA World 5* (#3), pp. 16-20.

## Division of Cooperative Forest Fire Control

- 1970 *Wildfire Statistics, 1970*. State and Private Forestry Cooperative, U.S. Forest Service. Washington: U.S. Department of Agriculture.

## Fuquay, D. M.

- 1962 "Mountain Thunderstorms and Forest Fires." *Weatherwise* 15, pp. 149-152.

## Goyer, G. C.

- 1965 "Effects of Lightning on Hydrometeors." *Nature* 206, pp. 1203-1209.

## Heinselman, Miron L.

- 1971 "The Natural Role of Fire in the Northern Conifer Forests." In the Alaska Forest Fire Council and Alaska Game Commission.

## Kilgore, Bruce M.

- 1970 "Research Needed for an Action Program of Restoring Fire to Giant Sequoias." Pages 72-180 in *The Role of Fire in the Intermountain West*. Symposium sponsored by Intermountain Fire Research Council. Missoula: Montana School of Forestry.

## Klass, Philip J.

- 1969 "Lightning Strike Threat Increases." *Aviation Week and Space Technology* 90 (#1), pp. 88-93.

## Pierce, E. T.

- 1970 "Latitudinal Variation of Lightning Parameters." *Journal of Applied Meteorology* 9, pp. 194-195.

## Stokol'nikov, I. S.

- 1965 *Study of Lightning and Lightning Protection*. Joint Publications Research Service #29, 407. U.S. Department of Commerce. Washington: U.S. Government Printing Office.

## Uman, Martin A.

- 1969 *Lightning*. New York: McGraw-Hill.  
1971 *Understanding Lightning*. Carnegie. Pennsylvania: Bek Technical Publications.

## Waldron, Howard H.

- 1967 *Debris Flow and Erosion Control Problems Caused by the Ash Eruptions of Irazo Volcano, Costa Rica*. U.S. Geological Survey Bulletin #1241-I. U.S. Department of the Interior. Washington: U.S. Government Printing Office.

## White, Donald E.

- 1965 *Geothermal Energy*. U.S. Geological Survey Circular #519. U.S. Department of the Interior. Washington: U.S. Government Printing Office.

## Zegel, Ferdinand H.

- 1967 "Lightning Deaths in the U.S.: A Seven-Year Survey from 1959 to 1965." *Weatherwise* 20, pp. 169-173; 179.



**American National Red Cross**

- 1973 "Selected Data -- Disaster Relief Operations: Snowstorms, Ice Storms and Blizzards, January, 1968-February, 1973." Washington: American National Red Cross Headquarters.

**American Public Works Association**

- 1965 *Snow Removal and Ice Control in Urban Areas*. Research Project #114. Chicago: American Public Works Association.

**Archer, Paula**

- 1970 *The Urban Snow Hazard: A Case Study of the Perception of, Adjustments to, and Wage and Salary Losses Suffered from Snowfall in the City of Toronto During the Winter of 1967-1968*. M.A. Thesis. Toronto: University of Toronto.

**Baumann, Duane D. and Clifford S. Russell**

- 1971 *Urban Snow Hazard: Economic and Social Implications*. Urbana: University of Illinois Water Resources Center.

**Brouillette, John and James Ross**

- 1967 "Organizational Response to the Great Chicago Snowstorm of 1967." Research Note #14. Columbus: The Ohio State University Disaster Research Center.

**Changnon, S. A., Jr.**

- 1969 *Climatology of Severe Winter Storms in Illinois*. Illinois State Water Survey Bulletin #53. Springfield: State of Illinois.

**Cochrane, Harold C., et al.**

- 1975 *Urban Snow Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Farney, F. C. F. and B. A. Knowles**

- 1974 "Urban Snow Hazard: Marquette, Michigan." Pages 167-174 in Gilbert F. White (editor) *Natural Hazards: Local, National, Global*. New York: Oxford University Press.

**Foster, L. T.**

- 1970 *On the Use of Weather Information in Decision-Making: The Example of Municipal Managers and the Urban Snow Hazard*. Masters Thesis. Toronto: University of Toronto Department of Geography.

**Lennon, Joseph T.**

- 1967 "Cost Analysis of Snow and Ice Control Operations." In *American Public Works Association Yearbook, 1967*. Chicago: American Public Works Association.

**McConnell, H. Hugh and Jennifer Lewis**

- 1972 "Add Salt to Taste." *Environment* 14 (November), pp. 38-47.

**National Research Council**

- 1967 *Manual on Snow Removal and Ice Control in Urban Areas*. Technical Memorandum #93. Ottawa, Canada: National Research Council Working Group on Urban Snow Removal.

**Relf, E. C. and S. B. Goodwillie**

- 1968 *Annotated Bibliography on Snow and Ice Problems*. Natural Hazards Research Working Paper No. 2. Toronto: University of Toronto.

**Rooney, John F., Jr.**

- 1967 "The Urban Snow Hazard in the United States: An Appraisal of Disruption." *Geographical Review* 57, pp. 538-559.
- 1969 "The Economic and Social Implications of Snow and Ice." In R. J. Chorley (editor) *Water, Earth, and Man*. London: Methuen.

**Savas, E. S.**

- 1969 "Planning for Snow Emergencies." New York: Office of Administration, Office of the Mayor.

**TORNADO****Changnon, S. A. and R. G. Semonin**

- 1966 "A Great Tornado Disaster in Retrospect." *Weatherwise* 19 (April), pp. 56-65.

**Eagleman, Joe R. and Vincent U. Muirhead**

- 1971 "Observed Damage from Tornadoes and Safe Location in Houses." *Preprints of the*

Form, W. H. and S. Nosow

1958 *Community in Disaster*. New York: Harper.

Kessler, Edwin

1970 "Tornadoes." *Bulletin of the American Meteorological Society* 51, pp. 926-936.

1972 "On Tornadoes and Their Modification." *Technology Review* (May), pp. 48-55.

Melaragno, Michele G.

1968 *Tornado Forces and Their Effects on Buildings*. Manhattan: Kansas State University.

Moore, Harry Estill

1958 *Tornadoes Over Texas*. Austin: University of Texas Press.

1964 *And the Winds Blew*. The Hogg Foundation for Mental Health. Austin: University of Texas.

National Weather Service

1973 *Tornado Preparedness Planning* (revised). Washington: U.S. Government Printing Office.

Pearson, Allen D.

1971 "Statistics on Tornadoes That Caused Fatalities 1960-1970." *Preprints of the Seventh Conference on Severe Local Storms*. American Meteorological Society, Kansas City, Missouri.

Perry, Stewart E., Earle Silber and Donald A. Black

1956 *The Child and His Family in Disaster: A Study of the 1953 Vicksburg Tornado*. National Academy of Sciences, National Research Council Disaster Study #5. Washington: National Academy of Sciences.

Sadowski, A. F.

1966 "Tornadoes with Hurricanes." *Weatherwise* 19, pp. 71-75.

Schanche, Don A.

1974 "The Emotional Aftermath of the 'Largest Tornado Ever.'" *Today's Health* 52 (August), pp. 16-19.

Skaggs, Richard H.

1969 "Analysis and Regionalization of the Distribution of Tornadoes in The States." *Monthly Weather Review* (February), pp. 103-115.

Somes, N. F., et al.

1971 *Lubbock Tornado: A Survey of Damage in an Urban Area*. National Academy of Standards Technical Note #55. Department of Commerce, Washington: U.S. Government Printing Office.

Thompson, J. Neils, et al.

1970 *The Lubbock Storm of May 11, 1959*. Washington: National Academy of Sciences.

Taylor, James B., Louis A. Zurecher and William Key

1970 *Tornado: A Community Response to Disaster*. Seattle: University of Washington Press.

Vellozzi, Joseph W. and John J. Henley

1972 "Procedures and Criteria for Wind Resistant Design." Paper presented at the National Workshop on Building Practices for Earthquake Mitigation. National Bureau of Standards, National Science Foundation, Boulder, Colorado.

Wallace, A. F. C.

1956 *Tornado in Worcester: An Exploratory Study of Individual and Community Behavior in an Extreme Situation*. National Academy of Sciences, National Research Council Disaster Study #3. Washington: National Academy of Sciences.

Wilson, John W. and Griffith M. Morgan, Jr.

1971 "Long Track Tornadoes and Their Significance." *Preprints of the Seventh Conference on Severe Local Storms*. American Meteorological Society, Kansas City, Missouri.

Wolford, V. L.

1960 *Tornado Occurrences in the United States*. U.S. Weather Bureau, U.S. Department of Commerce, Washington: U.S. Government Printing Office.

## TSUNAMI

Anderson, William A.

- 1970 "Tsunami Warning in Crescent City, California and Hilo, Hawaii." Pages 116-124 in National Academy of Sciences, *The Great Alaska Earthquake of 1964: Human Ecology*. Washington: National Academy of Sciences.

Baker, Martin K.

- 1971 *A Study of the Effectiveness of a Public Media Tsunami Education Program in Selected Coastal Towns in Alaska*. Doctoral Thesis. Boulder: University of Colorado Department of Sociology.

Cox, Doak C.

- 1961 *Potential Tsunami Inundation Areas in Hawaii*. Hawaii Institute of Geophysics Report #14. Honolulu: University of Hawaii.
- 1963 *Status of Tsunami Knowledge*. Proceedings of the Tenth Pacific Science Congress. Monograph #24. Paris: International Union of Geodesy and Geophysics.
- 1964 *Tsunami Forecasting*. Hawaii Institute of Geophysics, IIG 64-15. Honolulu: University of Hawaii.
- 1968 *Performance of the Seismic Sea Wave Warning System, 1948-1967*. Institute of Geophysics. Honolulu: University of Hawaii.

Haas, J. Eugene

- 1971 *Final Report on Effectiveness of Tsunami Warning System in Selected Coastal Towns in Alaska*. Submitted to the Environmental Science Services Administration. Boulder: University of Colorado Institute of Behavioral Science.

Haas, J. Eugene and Patricia B. Trainer

- 1973 "Effectiveness of the Tsunami Warning System in Selected Coastal Towns in Alaska." In *Proceedings of the Fifth World Conference on Earthquake Engineering*. Rome, Italy.

Hawaii Department of Defense, Civil Defense Division

- 1971 *Plan for Emergency Preparedness*. Honolulu, Hawaii.

U.S. Department of Commerce

- 1965 *Tsunami! The Story of the Seismic Sea-Wave Warning System*. Washington: U.S. Government Printing Office.
- 1969 *Communication Plan for Tsunami Warning System*, sixth edition. Rockville, Maryland: U.S. Department of Commerce.
- 1969 *Regional Tsunami Warning System in Alaska*. U.S. Coast and Geodetic Survey. Washington.
- 1970 *United States National Report: Tsunami Warning System*. U.S. Coast and Geodetic Survey. Rockville, Maryland: U.S. Department of Commerce.

## VOLCANO

Bullard, Fred M.

- 1962 *Volcanoes in History, in Theory, in Eruption*. Austin: University of Texas Press.

Coats, Robert R.

- 1950 *Volcanic Activity in the Aleutian Arc*. U.S. Geological Survey Bulletin #974-B. U.S. Department of the Interior. Washington: U.S. Government Printing Office.

Corps of Engineers

- 1966 *Review Report on Survey for Lava Flow Control, Island of Hawaii, State of Hawaii*. U.S. Department of the Army. Honolulu, Hawaii: Corps of Engineers, Fort Armstrong.

Crandell, Dwight R.

- 1973 "Potential Hazards from Future Eruptions of Mount Rainier, Washington." U.S. Geological Survey Miscellaneous Geological Investigations Map #1-836. U.S. Department of the Interior. Washington: U.S. Government Printing Office.

**Garretson, Harry W.**

- 1973 "Thermal Power Plant Siting in the Pacific Northwest." In Power Planning Committee, Pacific Northwest River Basins Commission *A Panel Discussion on Thermal Power Plant Siting in the Pacific Northwest*. Vancouver, Washington: Pacific Northwest River Basins Commission.

**Gutierrez, Celendonio**

- 1972 *A Narrative of Human Response to Natural Disaster: The Eruption of Paricutin*. College Station: Texas A&M University, Environmental Quality Program.

**International Volcanological Association**

- 1960 *Catalogue of the Active Volcanoes of the World*. Naples, Italy: International Volcanological Association.

**Juble, Werner and Henry Coulter**

- 1955 "The Mt. Spurr Eruption, July 9, 1953," *American Geophysical Union Transactions* 36, pp. 199-202.

**Lachman, Roy and William Bonk**

- 1960 "Behavior and Beliefs During the Recent Volcanic Eruption at Kapoho, Hawaii." *Science* 131, pp. 1095-1096.

**Macdonald, Gordon A.**

- 1962 "The 1959 and 1960 Eruptions of Kilauea Volcano, Hawaii, and the Construction of Walls to Restrict the Spread of the Lava Flows." *Bulletin Volcanologique* 24, pp. 248-294.

- 1972 *Volcanoes*. Englewood Cliffs, New Jersey: Prentice-Hall.

**Macdonald, Gordon A. and A. T. Abbott**

- 1970 *Volcanoes in the Sea: The Geology of Hawaii*. Honolulu: University of Hawaii Press.

**Murton, Brian J. and Shinzo Shimabukuro**

- 1972 *Human Adjustment to Volcanic Hazard in Puna District, Hawaii*. International Geophysical Union Commission on Man and Environment Paper. Honolulu: University of Hawaii.

**Ollier, Cliff**

- 1969 *Volcanoes*. Cambridge, Massachusetts: The M.I.T. Press.

Department of the Interior. Washington: U.S. Government Printing Office.

**1974 Volcanic Hazards on the Island of Hawaii.**

Work done in cooperation with the Department of Housing and Urban Development, Office of the Assistant Secretary for Policy Development and Research. Geological Survey Open-File Report 74-239.

**Warrick, Richard A.**

- 1975 *Volcano Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

**Williams, Howel**

- 1953 *The Ancient Volcanoes of Oregon*. Condon Lectures. Eugene: Oregon State System of Higher Education.

**Woods, W. Kelly**

- 1973 "Power Plant Siting in Oregon." In Power Planning Committee, Pacific Northwest River Basins Commission *A Panel Discussion on Thermal Power Plant Siting in the Pacific Northwest*. Vancouver, Washington: Pacific Northwest River Basins Commission.

**Wilcox, Ray E.**

- 1959 *Some Effects of Recent Volcanic Ash Falls, With Especial Reference to Alaska*. U.S. Geological Survey Bulletin #1028-n. U.S. Department of the Interior. Washington: U.S. Government Printing Office.

**WINDSTORM**

**Ashwell, I.**

- 1971 "Warm Blast Across the Snow-Covered Prairie." *Geographical Magazine* 43, pp. 858-863.

**Brinkmann, Waltraud A. R.**

- 1973 *A Climatological Study of Strong Downslope Winds in the Boulder Area*. NCAR Cooperative Thesis #27, INSTAAR Occasional Paper #7. Boulder, Colorado: The National Center for Atmospheric Research.

- 1975 *Local Windstorm Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

Brinkmann, Waltraud A. R., et al.

- 1975 *Severe Local Storm Hazard in the United States: A Research Assessment*. Boulder: University of Colorado Institute of Behavioral Science (forthcoming).

City of Boulder

- 1970 *Analysis of Damage to Residential Properties from High Winds Occurring on January 7 and January 31, 1969, in Boulder, Colorado*. Boulder: City Manager's Office.

Defense Civil Preparedness Agency

- 1972 *Protecting Mobile Homes from High Winds*. DCPA #TR-75. U.S. Department of Defense. Washington: U.S. Government Printing Office.

Harris, R. B.

- 1962 *Wind Forces on Mobile Homes*. Final Report. University of Michigan, College of Engineering. Department of Civil Engineering under contract to Foremost Insurance Company. Grand Rapids, Michigan.

Miller, W. H.

- 1968 "Santa Ana Winds and Crime." *The Professional Geographer* 20 (January), pp. 23-27.

Miller, D. J.

- 1972 *Human Perception of and Adjustment to the High Wind Hazard in Boulder, Colorado*. M.A. Thesis. Boulder: University of Colorado Department of Geography.

National Bureau of Standards

- 1970 *Wind Loads on Buildings and Structures*. Proceedings of Technical Meeting, Building Science Series #30. U.S. Department of Commerce. Washington: U.S. Government Printing Office.
- 1974 *Design, Siting and Construction of Low-Cost Housing and Community Buildings to Better Withstand Earthquakes and Windstorms*. Edited by William F. Reys and Emil Simiu. Report prepared for U.S. Agency for International Development by Center for Building Technology, Institute for Applied Technology. Washington: U.S. Government Printing Office.

National Science Foundation

- 1970 *Wind Loads on Structures*. Summary Report on a Conference Held at the California Institute of Technology, Pasadena, California, December 18-19, 1970. Washington: National Science Foundation.

Sergius, L. A., G. R. Ellis and R. M. Ogden

- 1962 "The Santa Ana Winds of Southern California." *Weatherwise* 15, pp. 102-105, 121.

Stoeckeler, J. H.

- 1962 *Shelterbelt Influence on Great Plains Field Environment and Crops*. U.S. Department of Agriculture, Production Research Report #62. Washington: U.S. Government Printing Office.

Thom, H. C. S.

- 1968 "New Distributions of Extreme Winds in the United States." *Journal of the Structural Division, Proceedings of the American Society of Civil Engineers* 94 (July), pp. 1787-1801.

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